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SURGICAL PHASES OF ENTEROPTOSIS

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IT is with some hesitation that I present this paper upon "The Surgical Phases of Enteroptosis," for the present status of this question does not warrant the establishment of dogmatic lines for the operative treatment of general ptosis of the abdominal organs; and were we, with our limited knowledge, to assume that this condition belongs largely to the surgical domain, even a greater number of unjustifiable operations would be performed than has been noted in the treatment of nephroptosis. It would be better, therefore, to consider these cases under the caption: "The Surgical Treatment of Cases of Enteroptosis in Which Medical and Mechanical Means of Relief Have Failed."

Since Glénard first wrote his classic article upon the disabilities produced by descensus of the abdominal viscera, comparatively little progress has been made in the diagnosis and treatment of enteroptosis until within the last few years.

The Roentgen Ray in Diagnosis. While with certainty dilatation and descensus of the stomach have been diagnosticated, before the application of the X-ray for this purpose, the determination of the exact extent of ptosis of the large intestine and of the mechanical disabilities produced by it was, at best, more or less hypothetical. For several years I have systematically employed atmospheric distention of the colon for the purpose of defining its position, but this has always been an uncertain method. The use of the sigmoidoscope is also unproductive of results. The recent employment of the X-ray, for the purpose of determining the extent of ptosis of the colon and of the stomach, is one of the most valuable additions to our clinical methods of examination, and has largely made up the deficiencies which have been noted in our previous diagnostic procedures. Having studied a large number of cases, with and without the aid of the X-ray, I now feel that it is an absolutely essential factor in formulating any plan of treatment in these cases, except when the ptosis is encountered in the course of an operation for some other more important indication. Then the history of the case, so far as it relates to the symptoms of indigestion, intestinal pain, tympanites, etc., must be the surgical guide.

Enteroptosis Primarily a Medical Condition. At the University of Pennsylvania there is a group of young men in the Medical and Roetgen Ray Departments, who have been systematically studying the question of enteroptosis, from the diagnostic and therapeutic standpoints, for the last six or eight years; and some of the best literature upon this subject has emanated from this source. The surgical consideration of this subject, therefore, has been of great interest, for I have felt that with this group of enthusiastic colleagues, who have investigated the question so thoroughly from the medical aspect, it is possible for these patients to have the best treatment before resorting to any surgical means of relief.

From the experience of these investigators, it is very evident that a majority of patients

Fig. 1. Normal situation of stomach in a formaline hardened subject. (By courtesy of Dr. Piersol. Human Anatomy, 1907.)

suffering from various ptosis of the abdominal viscera may be so much relieved, or cured, that surgical intervention is unnecessary. One is safe, therefore, in making the statement that thus far we may look upon these various conditions as belonging to the province of a skilled physician, and only when he fails and largely by his advice should operative intervention be considered.

In the gynecological department of the University of Pennsylvania Hospital, it is a rule, after arriving at a determination that enteroptosis is the sole or chief factor in a patient's major symptoms, at once to transfer the case to the medical wards for treatment. It is not a matter of regret to say that only a few of these cases are referred back to us for surgical treatment, for the patient, if not actually cured, is usually sufficiently improved in her general condition to be satisfied with the result, and prefers even moderate relief to a questionable cure by operation. We employ the expression "questionable cure" after the study of our cases, for while we have had a number of brilliant results we have also had several failures. Consequently it may be said, that up to the present time there is no plan of surgical treatment which offers a maximum certainty of cure, even when the physician fails to relieve the patient by medical and mechanical means.

Therefore, as a preliminary statement, one may say that the surgical treatment is still under consideration; but it is our hope, based upon the study of a considerable number of patients, that further principles may be elaborated for guidance in cases of exaggerated ptosis, incurable by other than surgical means, that may prove reasonably efficacious.

Reflex Symptoms. These cases are usually grouped under the ill-defined terms, neurasthenia, dyspepsia, indigestion, and reflex neuroses, all of which names are employed as mere subterfuges, for they do not define any given disease and simply beg the question.

With increasing experience I have come to look upon the so-called "reflex pains," refer-

Fig. 2. Stomach removed, showing normal situation of transverse colon. The splenic flexure is situated much higher than the hepatic. In exaggerated ptosis of this part of the colon the two flexures may be kinked acutely. (By courtesy of Dr. Piersol. Human Anatomy. 1907.)

Fig. 3. Exaggerated ptosis of the stomach without serious symptoms; the notch in the smaller curvature is comparatively shallow and there is no obstruction at the pylorus. In such a case operation is not indicated because the gastric symptoms are not exaggerated. Such a condition is likely to be encountered in a case of congenital habitus. (Skiagraph by Dr. Pancoast.)

able to the abdominal viscera as of minor significance. Until Glénard's disease was more generally recognized and understood, the pelvic organs were looked upon as the source of a multitude of these symptoms, in fact they were considered veritable plague-spots for reflex emanations.

A dangerous "pelvic myopia" was engendered in the past by this reflex theory: for under its guidance many a minor pelvic lesion has been corrected, while the symptoms of a major abdominal lesion may have been cloaked under the hazy cloud of reflex symptoms. This has especially been true in cases of chronic gastric ulcer, cholelithiasis, and notably of enteroptosis. That the teaching along this line is becoming broader is quite evident: for in any modern medical school where cases are systematically studied in ward-classes, it is seldom indeed that even the poorer students will fail to recognize a well-defined group of symptoms pointing to ptosis of the abdominal viscera. In gynecological cases these ptoses are especially likely to occur, for the descent of the viscera may be a sequel to rapid child-bearing or difficult labors, which leave in their train a diastasis of the recti muscles and relaxation of the pelvic floor, with a retroflexion or a prolapsus of the uterus. Time and again, I have seen the pelvic symptoms incident to the pelvic disability entirely relieved by operative intervention; but the patient continued to suffer with all of her gastrointestinal symptoms, not because they were reflex, but from

Fig. 4. Exaggerated ptosis and dilatation of stomach. Deep notch in smaller curvature. Acute kinking at the pylorus which is situated relatively high. Fig. 5 represents the same case after omento-ventral suspension. (Coffey hammock operation.) This patient was completely relieved by this operation. (Skiagraph by Dr. Pancoast.)

the fact that the ptosis, which was coincident with the pelvic disability, was quite as bad after the operation as before. It has been this class of cases which has drawn my attention to the various means which may be adopted for their cure.

Variation in Symptoms. There is no set of cases which shows such a wide variation in symptoms in proportion to the lesion as this. In one case the stomach, colon, and kidneys may all be in an exaggerated degree of descensus, and yet very few symptoms are evident. In another case of less ptosis, the functional disturbances are very decided. The use of the X-ray gives us much information in differentiating cases: for, in one set in which there are decided symptoms, a deep notch may be found in the smaller curvature of the stomach: in another, a marked prolapsus of the transverse colon is noted; while in a third the bismuth injection reveals a redundant sigmoid. In another class of cases, even a greater degree of ptosis is noted, and yet there are no abnormal detention points, hence peristalsis carries the food onward without serious impediment. (Figs. 3 and 4).

If, therefore, an operation were to be instituted in every case of ptosis, simply because the X-ray demonstrated even a marked splanchnoptosis, I am sure we would pass through as irrational a period of surgery as has been exhibited in the treatment of movable kidneys, and as I fear, is being shown at present by the seeker after surgical novelties in the employ-

Fig. 5. Below the dark circle the transverse colon, after showing a kink from the hepatic flexture to this point, drops almost to McBurney's point, where it is held by old adhesions. This patient suffered severe colicky pains, and was only relieved by release of adhesions.

ment of gastrointestinal anastomisis for all sorts of stomach lesions. The very fact that thousands of physiologically movable kidneys have been anchored most unjustifiably should be a warning against the inauguration of a similar policy with reference to ptosis of the intestinal tract.

In the neurasthenic individual who complains of indigestion, nervousness, etc., etc., who has as an incident a movable kidney, there is no procedure less likely to bring salutary results than the anchoring of the kidney. Nephrorrhaphy in such cases, is an opprobrium to surgical art, for these patients are not relieved, but on the contrary are made worse, as is every neurasthenic who is not relieved by an operation; for their morbid intraspective ideas of disease become all the more fixed by this failure.

From our experience with the use of the X-ray as a diagnostic means, we find we are more nearly able to select those cases in which mchanical defects are noted, which may possibly be corrected by operations so that the gastrointestinal functions may be carried on without painful or disabling symptoms.

SURGICAL GROUPING OF CASES

As we have encountered these cases they may be grouped for consideration under the following headings:

1. *The Cases of Congenital Habitus.* As Smith has pointed out in his excellent article on this subject (Transactions of the Am. Gynec. Society, 1906), these cases are characterized: 1. By a flabbiness or hypotonus of the body tissues. 2. By a lack of vital energy. 3. By a more or less pronounced backwardness in development. Symptomatically, the patient complains of "inability to carry on her work without exhaustion, nervousness, often times melancholy, constipation, and disturbances of digestion and other functions, such as those of menstruation and urination. Patients commonly have pain in the back, in one or both sides, and in the lower abdomen, bearing-down pain, and leucorrhœa." In other words, a type of neurasthenia in which the body may be

Fig. 6. The sharply marked black border located just below the round dot, which indicates the site of the umbilicus, represents the lower curvature of the stomach, which rests in the hammock produced by pulling the transverse colon up by the omentum which is fixed to the anterior abdominal wall. (Coffey operation.) (Skiagraph by Dr. Pancoast.)

aptly likened to a fully equipped electric plant with a dynamo too small to run it.

A surgeon who believes that he can make good this dynamic defect by any operation upon the ptosed organs, will find that his energies are badly directed, for little can be done for these patients by the physician, and only harm can follow surgical intervention, except in the rarest exceptions. Therefore, it is most unwise to attempt surgical treatment for a bodily habitus which does not involve one organ, but usually all in the abdominal cavity. To tack up one or both kidneys, to suspend any of the hollow viscera, or to shorten the ligaments of the uterus, corrects only one small part of the general trouble, and as a result of the operation, a pathologic condition may be left behind which imposes a still greater burden upon the defective dynamo and makes a more hopeless neurasthenic of the patient than ever.

2. *The Cases Acquired from Natural Causes.* This class is especially noted in women who have rapidly borne children, without proper obstetrical care and puerperal supervision. The pelvic viscera drop into vicious ptosis, due to the failure to repair the pelvic diaphragm and the inefficient return of the abdominal wall to its normal tonicity. Under these conditions the abdominal viscera lose their ventral support and tend to sag; and sooner or later the train of symptoms, so characteristic of this condition, appears. These cases, if treated at a reasonably early period, respond splendidly and give most satisfactory results. In many instances Webster's operation, in addition to the surgery necessary to restore the pelvic floor and the uterus to normal, effects a perfect cure.

Another group of cases, which I am convinced comprises a large number, includes women of very constipated habit. When one realizes that

Fig. 7. Exaggerated descensus and redundancy of the transverse colon, attended with recurring symptoms of obstruction. The loop could easily be twisted upon itself, and there were acute kinks formed at the hepatic and splenic flexures when the transverse colon was overloaded. Resection of fourteen inches of the transverse colon was followed by complete cure. The patient has gained 30 pounds since the operation. (Skiagraph by Dr. Pancoast.)

the colon is merely a reservoir for inspissated particles of feces, and that two of its sections, the transverse colon and the sigmoid, are very movable and may be greatly dragged upon by overloading, it does not seem possible to escape the conclusion that when the constipation extends, as it frequently does, over days and has been a habit for years, ill results from this undue traction upon the mesenteric attachments and the stomach, which is linked with the transverse colon, must inevitably take place. (Fig. 7.) Especially if, in addition to this bad habit, the patient subjects herself to excessive pressure and constriction of the abdominal wall, incident to a tight corset and clothing suspended from close-fitting waist bands. In this class of cases ptosis of the sigmoid, transverse colon, and stomach are likely to be noted in the order named. In some of our cases the sigmoid flexure has apparently been the chief trouble, for when its position was changed by operation so that it could not fall into a loop lying cramped up in Douglass' cul-de-sac, the symptoms were relieved. In such a sigmoid the constipation may increase to a type of fecal obstruction, for the greater its impaction the more acute becomes the kink at the brim of the pelvis and the greater the lateral pressure on the rectum. Such cases are likely to alternate between periods of obstinate constipation and

Fig. 8. Excessively redundant sigmoid flexure which could easily be pulled up as high as the diaphragm. A case like this may produce such exaggerated symptoms as to require resection. Two such cases have been encountered in our series, and both were relieved by excision of 14 and 16 inches respectively, of the sigmoid flexure with end to end anastomosis.

free diarrhœa, and may be characterized by more or less mucus in the stools. (Fig. 8.)

Also I am convinced that many of our women patients, who have pains ascribed to the left ovary, are really suffering from either a sigmoid ptosis or actual tension pain from the pulling of the sigmoidal mesentery over the brim of the pelvis. In the most exaggerated forms of this dislocation, actual obstruction or gangrene of the sigmoid may occur. Such a sequel as gangrene is extremely rare, for after heroic dosing with purgatives and injections of drastic enemeta, an evacuation is effected. In this class of cases I have resorted to three measures:

Festooning the redundant sigmoid back into the loin by means of its own mesentery; actual suture of the sigmoid to the ventral wall; and resection of the sigmoid. In cases of extensive ptosis of the transverse colon, with kinking either at the hepatic or splenic flexure, omento-ventral suture (Coffey operation) has been employed; and in one case in which there was a recurrence with a return of obstructive symptoms, 14 inches of the transverse colon was exsected and an end-to-end anastomosis done, with perfect relief of the patient.

3. *Acquired Cases from Post-operative Adhesions, Hernia, or Following the Removal of Large Tumors.* Every surgeon realizes that post-operative adhesions, when general, produce an infinite variety of intestinal symptoms from tympanites, constipation, regurgitation of food to actual obstruction and gangrene. It is with the chronic cases, affecting the colon and stomach, that this paper particularly deals.

No operation is more unsatisfactory than the breaking up of universal adhesions among small intestines, for a recurrence of symptoms is usually noted from reproduction of adhesions. Such an operation is truly a hit-and-miss procedure. On the other hand, in many cases the omentum gravitates to an inflamed area, or into an hernial sac, and becomes fixed by adhesions. Such fixations rarely give rise to exaggerated symptoms, as every surgeon knows; on the other hand, occasionally the transverse colon may be dragged into such an unnatural position that its well-known physiological ability to functionate, even under the most adverse conditions, is circumvented and aptosis and partial obstruction of the organ not only occurs, but the stomach is likewise drawn out of place and the pylorus may be kinked sufficiently to give rise to gastric symptoms. (Figs. 9 and 10; Fig. *d*.)

In both Class 2 and Class 3, the stomach is usually drawn downward by the gastro-colonic omentum, and the gastric symptoms may be the chief ones.

Post-Operative Care of These Cases. Many surgical results are vitiated by a too early release from the surgeon's supervision, and of all cases there are none to which this mistake worse applies than to the class under consideration. To perform any one of these operations without the most careful supervision of the patients subsequently, will lead more often to failure than to success. Therefore, the bowels should be carefully regulated to prevent a recurrence of constipation, and a carefully fitted abdominal binder, or corset, should be worn for months.

Review of Results. From a review of our case-histories certain very suggestive factors are bought out: In the first place, all of these suspension operations which are done with a view to lifting the viscera from a distorted position into a normal one, so that they may functionate properly without pathologic symptoms, fly in the face of anatomic laws and are always attended with a considerable risk of recurrence. This comes from the fact that, at best, the points of suspension are frail, and unless firm adhesions take place between the points of peritoneal contact, there will inevitably be a recurrence.

Notwithstanding all of these objections, our cases, which now number 35, show about 50 per cent of symptomatic cures, and the remainder give the usual story of patients not completely relieved by operation: some being slightly improved, some no better, while one or two claim to be worse than before the operation, and one died subsequent to operation.

Types of Operation. Among the operations which have been performed is Webster's, which consists in taking up a relaxed abdominal wall by bringing into apposition the recti muscles, and thus overcoming any further tendency to a diastasis which, in a sense, permits a variety of large ventral hernia. In these acquired cases some of the best results are noted, in that a return of the abdominal muscles to their normal restores the intra-abdominal force and visceral equilibrium, so that after a short time the patient's symptoms disappear.

Fig. 10. Exaggerated distortion and dislocation of the transverse colon, easily correctable by releasing the incarcerated omentum from an inguinal hernia. In such a case serious or even fatal obstructive symptoms, may be produced.

Fig. 9. Exaggerated ptosis and distortion of the colon, from adhesions following peritonitis. Discovered in an anatomical subject.

As observed in our cases, child-birth after any of these operations for ptosis may be followed by a recurrence. This is probably due to the fact that the uterus in its upward growth pushes the intestines out of the way, and temporarily relieves the suspension points of weight, but as soon as the child is born there is again dragging upon the points of fixation, with the probability of their breaking away, especially if the anterior abdominal wall is very flabby.

The operations which we have largely employed, in addition to the Webster operation,

are: Suspension of the sigmoid in cases of great redundancy and the suspension of the transverse colon by omentoventral suture (Coffey method). (Fig. 11.) In no case has gastroenterostomy been performed; and only twice have we performed the operation suggested by my colleague, Dr. Beyea, for the shortening of the gastric ligaments. In pronounced cases of ptosis of the stomach Beyea's operation, however, holds out a very satisfactory prognosis for relief, for in a considerable series of cases in his own hands the results have been most gratifying.

The operative conditions to be met in ptosis of the stomach are: kinking of the pylorus and marked dilatation. In these cases the value of the X-ray, in determining the difficulties in the case, is very great, for by this means one can usually estimate the amount of kinking at the pylorus. If the pylorus is situated low and the stomach assumes a perpendicular position, symptoms of ptosis are usually absent because evacuation of the stomach is very satisfactory. In such a case it would be most unwise to interfere in any way with the position of the stomach, for to lift it would most likely produce the very distortion which up to that time has not occurred, viz., kinking at the pylorus. If, on the other hand, the cardiac end of the stomach has become greatly dilated and pouch-like, necessitating the injection of food through a kinked pylorus, some mechanical restoration may be necessary. This is very well demonstrated by the deep notch shown in an X-ray negative, and is quite significant in the exaggerated cases with symptoms. (Fig. 4.) In some of these cases, the Beyea operation is of value, especially if there is no associated ptosis of the transverse colon. If this is present, it may be necessary after shortening the supports of the stomach, to relieve the stomach of the extra weight of the transverse colon by suspending it by means of the omentum. When the stomach is greatly prolapsed, so that it occupies almost or quite a pelvic position, it might be advisable to close the pylorus and perform a no-loop gastroenterostomy. Upon this point I have had little experience, for I have seen but one case in which the procedure seemed to be advisable. In another case, which I have recently observed, where a simple gastroenterostomy was performed by another surgeon, there was a type of vicious circle established through failure to close the pylorus. In this case the X-ray showed the bismuth passing out of the pylorus as well as the artificial opening — both, however, meeting below the site of anastomosis in the form of a whirlpool.

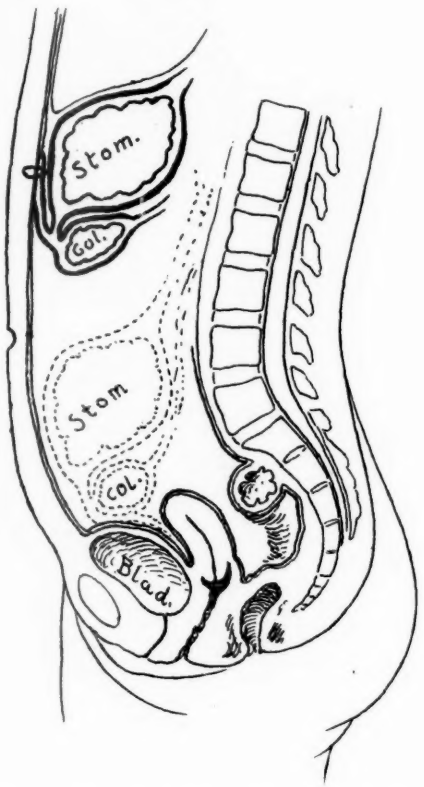


Fig. 11. Schematic depiction of the ventral attachment of the omentum for the support of the stomach and the suspension of the transverse colon. (Coffey operation.) The transverse colon and stomach may be elevated from the dotted outlined position to the nearly normal heavy lines.

CONCLUSIONS

From a review of our experience, we may draw the following tentative conclusions:

1. No case of enteroptosis should be operated upon until medical and mechanical means have been exhausted without relief.

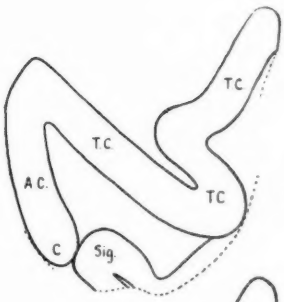


Fig. *a*.

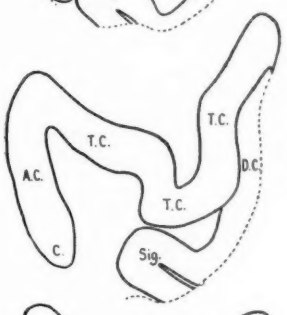


Fig. *b*.

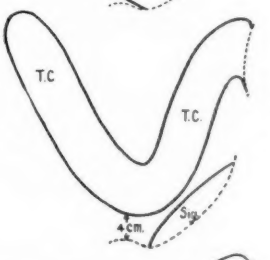


Fig. *c*.

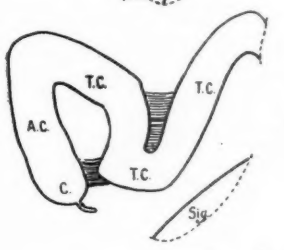


Fig. *d*.

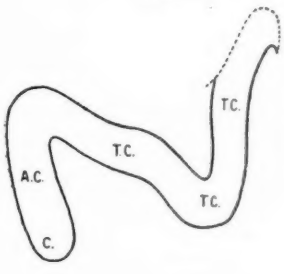


Fig. *e*.

Fig. *a*, *b*, *c*, *d* and *e*. Various abnormalisies in position of the transverse colon encountered in a series of dissections by Dr. Luther. Only in exaggerated case such as Figs. *a*, *b*, *c*, and *d* are symptoms likely to be noted. Even in some of these cases the colonic function may be carried on without serious disability.

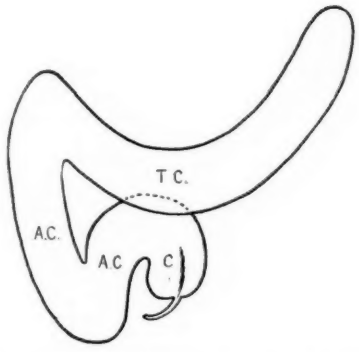


Fig. *f*. Unusual relationship of cæcum to transverse colon, not necessarily productive of pathological symptoms.

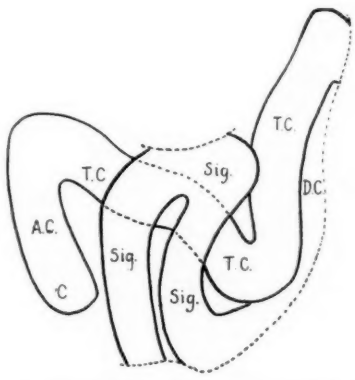


Fig. *g*. Exaggerated redundancy of sigmoid of pathologic type.

2. Cases of ptosis due to a congenital habitus will not be relieved by operation, except in the rarest instances; they should not be considered, therefore, as amenable to surgical treatment.

3. In order to arrive at an accurate estimate of the degree of ptosis, the X-ray should be employed.

4. In cases following child-birth, where the abdominal wall is very lax, thus destroying the equilibrium between the extra- and intra-abdominal force, resection of the relaxed ventral tissue through the method suggested by Webster, may give perfect relief, provided the diastasis has not been of such long standing that the abdominal organs are far below their normal levels.

5. In the latter case, in addition to the Webster operation, it may be necessary to suspend the colon by means of the omentum, thus relieving the stomach of the weight of this organ, and at least temporarily supporting the stomach until there may be a natural shortening of its ligaments.

6. In a simple gastroptosis without marked participation of the colon, the Beyea operation may be the one of preference.)

7. If the cardiac end of the stomach has been greatly dilated, forming a kink at the pylorus and a decided notch in the lesser curvature, a no-loop gastroenterostomy may be necessary, with closure of the pylorus. (This is merely a suggestion, for the writer has had experience in only one case with this operation.

8. In exaggerated cases of ptosis of the transverse colon, where a pendulous loop is formed which produces stasis of the fecal current, as well as tending to twist upon itself, with symptoms of partial obstruction, nothing less than excision of the redundant loop with end-to-end anastomosis will cure the case.

9. In cases of redundant sigmoid, with more or less constant pain in the left side, associated with obstinate constipation, a suspension of the sigmoid so as to pull it up out of this bad position in the pelvis, may give entire relief. On account of the constant mobility of the sigmoid a recurrence may be noted.

10. In exaggerated cases of redundant sigmoid attended with symptoms of extreme constipation, verging on to obstruction, a resection of the sigmoid may be advisable.

11. In all cases a carefully fitted abdominal support, or carefully adjusted straight front corset, should be worn after operation in order to give as much artificial support as possible.

In the study of these cases I have had the expert services of Dr. Pancoast, chief of the Roentgen Ray Laboratory of the University Hospital, and the assistance of Dr. Luther in the anatomical investigations, carried out in the anatomical and pathological laboratories.

DERMOIDS OF THE INGUINAL CANAL

With Report of a Case

By GEORGE C. WAISS, M. D., Chicago, Illinois

Dermoids in the region of the inguinal canal are of such rare occurrence as to make them of pathological interest, rather than of surgical importance. After a fairly careful search in the literature of dermoid cysts, I have been able to find a description of but one case at all resembling my own. So eminent an authority as Kaufman, in his special pathological anatomy, does not even mention dermoids in this region. Bland Sutton remarks that cysts, in relation to the inguinal canal, have been described as dermoids, but the records are not to be relied upon. Cysts have been assumed to be dermoids on no other evidence than that they contain pultaceous material. The only case in which the wall of the sac was examined microscopically is that of H. J. Patterson, and reported by him in the transactions of the London Path. Society in 1903.

He removed a cyst from the inguinal canal of a man, 35 years of age. The cyst measured 2¾ inch by 1 inch. A single hair was found on the interior of the anterior wall. This is the only case I can find which at all resembles my own, given below.

History of the patient, description of the operation, and of the cyst — Name, Henry Semler, male, aged 37 years. Nationality, German, a rather poorly nourished individual of anæmic appearance. Family history of no special interest.

Personal history: Has had the usual diseases of childhood, whooping cough, measles, diphtheria, and, at the age of fifteen, typhoid fever. Since that time, has been in the best of health. No history of specific infection at any time.

Fourteen years ago, while at work, he noticed a slight pain in the right inguinal region. Upon examination he found a swelling present, the size of a hickory nut. The pain left him the next day and he paid no more attention to it at the time. The swelling increased very slowly up to about January, 1906. From that time on, the patient thought, it increased in size rapidly.

Fig. 1. Photograph of the specimen after removal.

The patient entered St. Anthony's Hospital May 18, 1907. On examination, a swelling was found occupying the right inguinal region. The swelling was oval in shape, with the long axis in the line of the inguinal canal. Palpation gave a peculiar sensation to the examining fingers; it felt as though fluid would rush from one cavity into another, accompanied by a slight grating. The spermatic cord could be traced through the external abdominal ring, where it seemed to spread out over the swelling. Slight traction on the cord would move the swelling very slightly. A probable diagnosis of cyst, in relation to the spermatic cord, was made.

Operation: An incision was made directly over the swelling, and on cutting through the external oblique, the swelling, which was exposed, proved to be a cyst, and it was found that the spermatic cord was not included in the cyst, but was adherent to the external lateral side. The cord was carefully dissected free. After this it was found that the cyst was firmly adherent with the anterior surface of the pubic bone, to which it was attached by fibrous union. Although no hernia was present, there presented a large gap formerly occupied by the cyst. This gap was closed by interrupted catgut sutures.

Macroscopical appearance of the cyst. The cyst, upon removal, presented the following peculiarities: of oval outline, cystic consistency, length 7 cm., width 5 cm. The external covering, consisting of fibrous tissue, had a ragged appearance due to the numerous adhesions which had surrounded the cyst.

On incising the cyst, some fluid escaped, but the greater part of the interior was occupied by a pultaceous mass, mixed with a large amount of hair. The color of this hair was mostly blond, almost white. In length, the longest hair measured 6 cm.

The interior of the cyst wall presented an almost smooth surface, with a slight roughness here and there. At these spots hair was found attached to the wall, but the most hair was mixed with the pultaceous mass which filled the cyst.

Microscopical examination. A number of small pieces were taken from different parts of the cyst wall, and fixed in alcohol, formalin, and Zenker's fluid.

Sections stained by the usual method showed a well marked epidermis present. This epidermis is very uneven in its outline, as well as in its thickness. At some parts it measured but $\frac{1}{60}$ mm. increasing in thickness in parts up to $\frac{1}{5}$ mm.

The deepest cells of the epidermis are cylindrical in shape, and are perpendicular to the basement membrane. Their nuclei stain very deep with hemotoxlin. The layer above this cylindrical layer is composed of polyhedral cells, with a vesicular nuclei. These cells do not stain well, and I could not demonstrate any intercellular bridges.

The granular layer, although present, is not well marked. At times, there appears to be but one faintly staining cell lying between the layer below and the horny layer above. No stratum lucidum could be demonstrated in the section which I examined. The stratum cornium, which lay in close connection with the stratum granulosum, was demonstrated with Mallory's connective tissue stain, which colored the connective tissue blue, and the horny tissue a brilliant red.

The derma. No well-defined papillary layer is

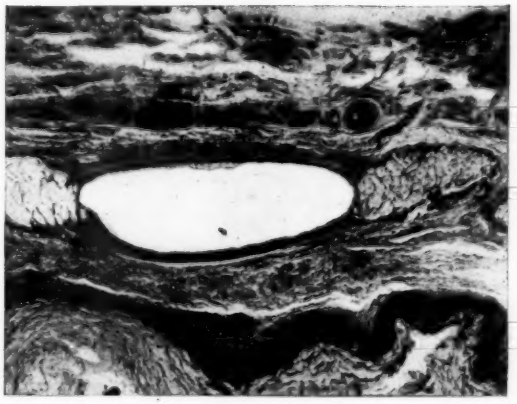


Fig. 2. Photomicrograph of cyst wall. × 74.

present, neither is the outline straight, but here and there are irregular connective tissue elevations. The reticular layer of the cornium consists of interlacing connective tissue fibers, which stain a dense blue with Mallory's connective tissue stain. This layer contains a large number of sebaceous glands. These glands are very large in size, and in some instances, cystic spaces are found in the center of them. Again, a number of cyst spaces are found with a sebaceous gland at either end of the same. The spaces are lined with the same epithelium as the sebaceous gland. A number of glandular structures are present. These gland-like structures are of different sizes and shapes. The most of them are composed of cubical epithelium. Some of them appear to be dilated sweat glands.

Hair follicles are found in small numbers, only.

Sweat glands, although present, were found in but few of the sections examined.

Blood-vessels were mostly found in the upper part of the reticular layer.

A very delicate layer of elastic tissue was demonstrated with Weigert's elastic tissue stain. No muscle tissue was found in the sections examined.

ARTERIO-SCLEROSIS OF THE UTERUS

With Report of a Case

By ROBERT B. SLOCUM, M. D., Wilmington, N. C.

THE case is one of severe uterine hemorrhage and "apoplexy" of an ovary in a woman twelve years past the menopause. The patient, a white woman 57 years old, was sent to me by Doctor George F. Lucas of Currie, N. C.

Complaint: Bleeding from the womb and pain in the right side.

Family History: Unimportant.

Past History: Generally negative. Menstruation began at fourteen; married at eighteen; during first pregnancy (19 years) patient had typhoid fever and aborted twins at about the third month. Since then she has borne eight living children and aborted twice. Menstruation ceased at 45 years. One year later bleeding recurred at irregular intervals: this grew to be very serious and patient was in a hospital eight months for treatment. After three years the bleeding stopped entirely and she enjoyed good health for eight years. During this time there was no bleeding at all.

Present Illness: One year ago, while lifting a rather heavy load, patient was seized with a severe pain in the right side. She was put to bed and a physician, who saw her at the time, called the attack acute appendicitis. The acute pain gradually subsided but has never left entirely. Shortly after this acute attack, while still in bed, uterine hemorrhages began, small amounts at first at irregular intervals, but increasing in spite of the treatment. She was kept in bed and given ergot freely for a month but with no improvement. The uterus was then curetted and packed but the bleeding recurred at once even more profusely than before. From this time until admission to the hospital (Aug. 27th) the bleeding was very profuse and patient grew weak and anæmic: in fact, she has never been out of bed a whole day since the acute attack a year ago. Curettage and packing (with various local applications) was repeated twice more without avail. It is noteworthy that there has never been any foul odor to the discharge.

Physical Examination: I saw the patient for the first time on August 27th. She was anæmic (hæmoglobin 35 per cent) but well nourished. The general examination was negative except for a systolic heart murmur which I thought to be hæmic in origin. There was no cardiac enlargement and the murmur was not transmitted to the axilla. No general arterio-sclerosis beyond what would be expected in a woman 57 years old. The urine showed a trace of albumin but no casts. Pelvic examination revealed a profuse, bloody discharge from the uterus, the blood being clear and having none of the foul odor characteristic of cancer. The crevix was hard, smooth, and pale. The uterus was rather large but otherwise seemed normal. A definite mass was felt in the region of the right ovary.

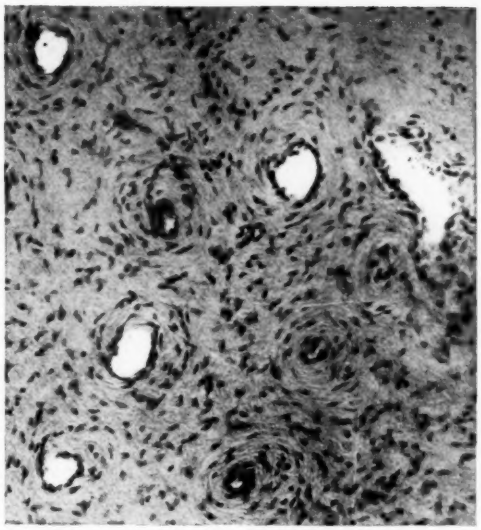
In view of the fact that the uterus had been curetted so much and the patient was in such bad condition an immediate hysterectomy was advised.

Operation: Aug. 29, 1907. Upon opening the abdomen the omentum was found to be adherent to the right ovary. This was easily separated and the ovary was found to contain a blood clot which had broken through the capsule and was adherent to the omentum. The ovarian arteries were hard, in fact, the left one continued to spurt after being tied reasonably tight. The uterine arteries also were hard and brittle so that they could be easily felt throughout their course. A pan-hysterectomy was done and the patient made a good recovery, leaving the hospital Sept. 23d, in excellent condition.

Pathological Examination: The uterus measures about 12 cm. in length, is hard and smooth. No infarct is found anywhere in it. Upon splitting it lengthwise the arteries stand out prominently in the muscu-

lature as hard, non-collapsible tubes. The right ovary contains an old clot of blood as large as a hen's egg. This clot seems to be simply an extravasation into the substance of the ovary. At one point the capsule is ruptured and some of the clot has escaped.

Microscopic Examination: The uterine mucosa shows nothing to suggest cancer. The uterine musculature is largely replaced by connective tissue and the arteries are much thickened, especially in the media (cf. section No. 2). The arteries are not occluded but thick and patent.



Photomicrograph of section of uterine wall.

As very little was to be found in the textbooks, I was interested in looking up the literature. Kelly (0) mentions arterio-sclerosis as a cause of uterine hemorrhage and gives a few references. Gebhard (1) and Orth (2) both mention it, the former stating that hyaline changes and calcification of uterine arteries are not rare.

Cruveilhier (3) first described a condition which he named "apoplexia uteri." He calls attention to the frequency with which hemorrhages into the body of the uterus are found at autopsy in cases of elderly women: the hemorrhages being limited to the body of the uterus, either into the mucosa or into the musculature. The condition he considers of no especial clinical interest as there is rarely any external bleeding and then only just before death and never in serious amounts.

Rokitanski (4) likewise speaks of "apoplexia uteri" in women of advanced age, the hemorrhages usually being into the fundus and posterior wall of the uterus, never into the cervix. At section the cavity of the uterus is often found filled with blood clots. Klob (5) describes the same condition in which the uterine substance is hard, and on section "the rigid arteries stand out as whitish, non-retracting stumps."

Herxheimer (6) is the first to report a case in detail — a woman 52 years old who, at autopsy, showed chronic nephritis, cardiac hypertrophy, and thrombosis, pulmonary infarcts and pneumonia, embolism of the right hypogastric artery, etc.

C. v. Kahlden (7) gives careful accounts of post-mortem findings in eight cases but no clinical histories. The eight cases are all in women of advanced age (from 52 to 87 years). The uterus may be large, small, or normal in size; blood clots are sometimes found in the uterine cavity; the hemorrhages are always into the body of the uterus and never into the cervix. On section of the uterus groups of arteries are found to have narrow lumens with thick, calcified walls. Microscopic examination shows the intima to be the coat chiefly thickened often obliterating the lumen entirely. The uterine muscle is largely replaced by connective tissue. All of his cases died of cardiac or pulmonary disease.

Dittrich (8) reports two cases of a similar character, 65 and 68 years, both having died of pulmonary disease. Simmonds (9) considers the hemorrhage to be due to weak cardiac action, the "apoplexy" being thus "only an agonal or preagonal phenomenon" which is usually of no clinical significance. So Barbour (10) says that "arterio-sclerosis after the menopause has been frequently described but never as accompanied by serious hemorrhage."

Popoff (11) describes a case of hemiplegia in a woman 40 years old, in whom both uterine arteries were found occluded by thrombi. Kaufmann (12), in speaking of cases of so-called "apoplexy of the uterus," says that they are due to arterio-sclerosis of the uterine arteries and, as a rule, have no clinical significance. Bland Sutton (13) refers to the same condition, calling it fibrosis of the uterus.

Palmer Findley (14) reports the case of a woman of 70 years who, fourteen days before death, complained of pain in the abdomen and chest; at the same time there was a bloody uterine discharge. At post-mortem there was found hemorrhagic infarction of the lungs and of the uterus caused by plugging of the sclerosed arteries with clots from the heart. He makes the point that the arterio-sclerosis, in itself, is not the cause of the uterine bleeding but only in connection with some circulatory obstruction, e. g., cardiac or pulmonary disease. This view is supported by the cases which we have cited: thus Herxheimer's case died with cardiac thrombosis, etc., all of v. Kahlden's cases died of pulmonary or cardiac disease, one of Dittrich's cases died of pneumonia and the other of emphysema.

It will be noticed that all of the cases quoted so far have been in women past the menopause, and have been of pathological more than of clinical interest. Whenever there has been any microscopic report the intima has been the coat chiefly thickened and the vessels are often occluded. This would seem to be the normal course. Westphalen (15) writing in connection with an article by R. Thoma ("Ueber die Abhangigkeit der Bindegewebsneubildung in der Arterien-intima von den mechanischen Bedingungen des Blutlaufes") states that in infants the intima is almost free from connective tissue; in young, menstruating women who have not borne children there is a small amount of connective tissue but in multipara there is a marked increase. He considers this to be due to the periodic changes in circulation. The only other arteries showing a similar condition are the splenic, the periodic circulatory changes in the spleen accounting for the condition. J. Balin (16) speaks of the obliteration of part of the uterine arteries after child-birth by the connective tissue of the intima.

In the following cases the clinical side becomes important on account of the external hemorrhages. If will be noted that the patients are all at, or near, the menopause: that the media is the coat involved most prominently, and that the vessels are not occluded but patent and rigid. (In making this grouping I have followed the suggestion of Solowij. cf. below.)

A. H. F. Barbour (17) reports a case of a woman 46 years old, multipara, upon whom a hysterectomy was done for severe hemorrhage. The vessels of the uterine mucosa and musculature, and also those of the broad ligaments, were thickened chiefly in the media. Kustner (18) mentions the death of a woman 36 years old from uterine hemorrhage due to arteriosclerosis. So Pozzi and Latteux (19) report two cases of hemorrhage from the same cause in patients 34 and 30 years of age. Marchesi (20) cites a case which is an exception to the rule in that the intima and adventitia were thickened instead of the media, although the patient was 32 years old and had required a hysterectomy to control the bleeding.

Reinecke (21) thinks that the hemorrhage is due to the fact that the sclerosed vessels are filled at the menses and the vaso-motors are unable to contract their stiffened walls. In all of his four cases (ranging from 40 to 45 years), hysterectomies were done for uterine hemorrhage. Chalmogoroff (22) reports three similar cases (29, 31, and 42 years of age) in which the media and adventitia were thickened.

Pechevin and Petit (23) also describe a hysterectomy for menorrhagia in a patient 41 years old. Curettage had been done twice but with no improvement. The uterine vessels were found to be much thickened. Morisani (24) had one case of "angiosclerosis invadens" (possibly syphilitic) upon which a vaginal hysterectomy was done to control the bleeding. Kustner (25) reports a case of a death from post-partum hemorrhage. The patient was a primipara, 36 years old, and examination showed sclerosis of the uterine arteries.

The most recent article is that of A. Solowij (26). His case was 41 years old and had been curetted four times for uterine hemorrhage without avail. Vaginal hysterectomy was finally done. The uterus was 11 cm. long, the muscle largely replaced by connective tissue and the arterial walls thickened, especially in the middle coat. The author then suggests the classification which we have followed, i. e., (a) cases of so-called apoplexy of the uterus and (b) cases of external bleeding: the former occurring in older women and having, he says, no clinical interest, the latter being found in

women near the menopause. In discussing treatment he says that ergot is of no avail.

Our case is thus of special interest in that it belongs to the second class although the patient is twelve years past the menopause. It will be remembered that she did have severe hemorrhages for three years following the menopause and if hysterectomy had been done at that time it would have been of no special interest. While writing the paper I have found a report of a similar case. Hysterectomy was done upon a woman 55 years old for uterine bleeding and the uterus showed simply arterio-sclerosis although cancer was suspected. (Dr. T. J. Watkins, (27.)

The common statement is that arterio-sclerosis of the uterus in women past the menopause is of no clinical interest because it causes infarction or apoplexy and not external bleeding. The case reported by Watkins and my own case both go to disprove this idea. Both of the cases were suspected to be malignant from the age, etc. That reported by Dr. Watkins had had severe hemorrhages for "four or five months," whether there had been any bleeding at the menopause or not is not stated.

In conclusion, arterio-sclerosis of the uterus may cause hemorrhage at the same period of life as cancer would. The diagnosis from very early cancer is difficult. As to treatment, ergot, curettage and packing, local applications are of no avail. In most of the cases reported a complete hysterectomy was done rather than a supravaginal because of the questionable diagnosis.

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THE DEATH OF THE MATURE FETUS IN LABOR[1]

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THE death of the mature fetus during the active period of labor affords an interesting and important study to the accoucheur, as well as to the general practitioner. To the parturient woman, already burdened with the weight of a nine months' pregnancy, with its countless aches and pains, and the ordeal of a tedious or operative delivery, the loss of her child strikes with telling effect. By a more careful supervision during pregnancy and labor, hundreds and thousands of children could be saved to their families and to the State, and the loss of their services can never be estimated. Only when the pregnant woman is placed under the care of a practitioner who is willing to give her the proper attention, and when the midwife, who delivers many thousands of children in the larger cities, is better trained and placed under competent supervision, will the mortality and morbidity rates be reduced.

It is the object of this study to investigate the death of mature children in labor, or within a few hours after delivery, where the death was traced directly to the birth. All fetuses measuring less than forty-eight centimeters in length and weighing less than five pounds are excluded as premature, and therefore possessing lowered vitality. Monsters of all descriptions, incapable of extra-uterine life, as well as children affected with syphilis and other constitutional diseases, are left out of the tables. In order that the life of the fetus is positively known, only those cases are accepted where the fetal heart was heard at some time during the labor. Many precipitate and other deliveries are recorded without stating that the heart tones were heard during labor, and these cases are also excluded.

The first eighty-five cases reported occurred in the service of the Cook County Hospital. Of these, twenty-eight bodies were posted and the findings are recorded. Eighty-nine cases occurred in The Chicago Lying-in Hospital. On these children no autopsies were allowed. The final sixteen occurred in my own practice, and of these, five autopsies were held. The report, then, is based upon 174 stillbirths and 16 deaths, occurring as an immediate result of labor, and 33 autopsies upon stillborn children.

STILLBIRTHS REPORTED IN CHICAGO FOR SEVEN YEARS[2]

Year	Male	Per cent	Female	Per cent	Total	Births	Population
1900	1,223	56.50	921	43.50	2,144	29,568	1,698,575
1901	1,137	57.00	857	43.00	1,994	26,648	1,757,010
1902	1,242	57.00	916	43.00	2,158	27,343	1,815,445
1903	1,325	57.25	1,031	42.75	2,356	29,033	1,873,880
1904	1,342	59.35	941	40.65	2,263	27,803	1,932,315
1905	1,344	57.35	998	42.65	2,342	26,092	1,990,750
1906	1,341	59.20	924	40.80	2,265	25,171	2,049,185
Total	934	57.50	6,588	42.50	15,542	101,658	

These 15,542 stillbirths include both macerated and "fresh" births at full term, and to this number are to be added those whose bodies are disposed of in various ways. It is estimated that but 30 per cent of the living births are reported to the Department. At this ratio, the estimated number of births for the seven years would approximate 575,000, and the percentage of stillbirths would be about 2.7. This agrees very well with the report of Schultze, who found the percentage among 3,843,018 births in Germany to be 2.61. Of 100,381 stillbirths, 20,804 were macerated, or .54 per cent of the whole number. Applying this same percentage to Chicago, it would appear that approximately 3,100 macerated full term children were born during the seven years, leaving 12,437 stillborns who have died during labor. This gives a percentage of 2.16, or one death in every 46 labors. While it is impossible to give any estimate of the number of stillborn children whose deaths are not recorded, it is probably a conservative statement to say that one child dies during labor in every 25 deliveries.

Following is a brief report of the cases:

[2]Reported by courtesy of Dr. M. O. Heckard.

[1] Read before the Chicago Gynecological Society, January 17, 1908.

No. of Case.	Age.	Para.	Pelvis.	Diagnosis.	Length of First Stage.	Length of Second Stage.	Heart Tones First Stage.	Heart Tones Second Stage.	Sex.	Weight of Child.	Length of Child.	Method of Delivery.	Cause of Fetal Death and Remarks.
1	30	1	Justo Minor	OLA	17	3.5	.....	140	M	7	50	Spontaneous	Fetal heart inaudible one half hour before delivery. Cord around neck twice and tight Autopsy.
2	26	1	Normal	ODA	14	4.75	150	120	M	7	48	Spontaneous	Dry labor. Premature rupture of membranes. Large caput. Child gasped a few times and died.
3	21	1	Normal	OLA	72	7	140	160	M	7	49	Forceps	Long first stage. Uterine inertia. Mother's pulse 130 a minute.
4	42	4	Normal	OLA	13	1/6	136	.....	F	8.4	52	Spontaneous	Pains continuous and severe for two hours preceding the delivery. Child died in the second stage.
5	17	1	Justo Minor	SLP	40	3	120	128	M	7	51	Extraction	Premature rupture of membranes. Meconium in liquor amnii. Long first stage. Autopsy.
6	23	1	Justo Minor	OLA	15	1/2	140	70	M	6	53	Spontaneous	No cause of death discovered.
7	24	1	Simple Flat	OLA	30	7	160	160	M	7.5	50	Forceps	Child died from pressure during the long labor. Inertia uteri. Mother's pulse 148.
8	23	2	Flat	OLA	14	2	130	70	F	8.5	54	Version	Threatened rupture of the uterus. Child died from compression by the uterine walls.
9	23	2	Flat Justo Minor	ODA	24	3	136	148	F	8	50	Forceps	Induced labor at term. Colpeurynter. Outlet contracted. Fetus killed by the forceps. Autopsy.
10	24	1	Normal	ODA	10	2	120	.....	F	6	48	Spontaneous	Hydramnion. Two gallons of liquor amnii. Premature rupture of the membranes.
11	21	1	Simple Flat	OLA	10	3	128	138	F	6	50	Forceps	Fetal heart irregular in second stage. Meconium in liquor amnii. Premature rupture of membranes.
12	18	1	Normal	OLA	7	2	150	160	M	5.7	49	Spontaneous	Hydramnion. Fetal heart irregular after membranes ruptured. Child died from pressure. Autopsy.
13	18	1	Normal	SDA	14	2	160	80	M	6	52	Extraction	Fetal head caught at the inlet in the extraction. Autopsy.
14	23	2	Normal	OLP	18	1	140	140	F	6.5	49	Spontaneous.	Cord wrapped tightly around the body twice.
15	37	6	Flat Justo Minor	FLA	36	12	160	170	M	8	54	Version	Forceps on aftercoming head. Cord pulsating feebly just before version. Prolonged labor. Child died from injury.
16	19	3	Normal	ODP	2	1/2	146	130	M	7.5	51	Spontaneous	No recorded cause of death.
17	19	1	Normal	ODP	6	6	140	140	F	11	58	Version	Head was caught at pelvic inlet. Extraction very difficult.
18	18	1	Flat	SLA	10	1/2	160	160	M	6	50	Extraction	Head caught at inlet. Autopsy.
19	27	3	Normal	Twins SCDA	120	1/2	.....	.....	F	7	48	Version	First child alive. SCDA resulted when second membranes ruptured. Child died in ten minutes. Premature detachment of placenta.
20	35	1	Normal	MLA	6	1	160	160	F	8	52	Version	Large caput succedaneum.
21	25	1	Normal	SDA	36	3	148	156	F	8.5	51	Extraction	Narrow pubic arch. Difficult extraction.
22	37	1	Normal	ODP	96	1/2	130	.....	M	8.7	54	Craniotomy	Naegele Obliquity. Accouchement forcè. Version. Child died in extraction. Craniotomy on aftercoming head.
23	24	1	Normal	Twins OLA	10	1/2	150	.....	M	6.6	50	High Forceps	Eclampsia. Manual dilatation of cervix. First child alive. Second dead.
24	20	1	Justo Minor	SCDA	24	1/2	132	150	M	7.5	52	Version	Elbow in vagina. Prolapsed cord. Shoulder engaged. Internal version difficult. Child died from pressure on cord.
25	19	1	Normal	SDA	8	2	144	150	M	9	54	Extraction	Double breech. Brought down anterior foot. Head caught at inlet.
26	18	1	Simple Flat	SLA	24	6	124	130	M	9	52	Extraction	Head caught at inlet.
27	37	1	Justo Minor	ODA	96	.....	150	.....	M	7	50	Version	Child died from pressure in the first stage. Premature rupture of membranes. Autopsy.
28	24	1	Justo Minor	OLA	10	1.5	142	136	M	6	49	High Forceps	Eclampsia. Manual dilatation of cervix. Autopsy.
29	20	2	Justo Minor	SCDA	24	1.5	160	80	M	6	48	Spontaneous	Child died twenty minutes before delivery from prolapsed cord.
30	19	1	Normal	SLA	8	2	138	140	M	9	56	Extraction	Child died from difficult extraction. Ecchymoses over body. Autopsy.
31	18	1	.....	SLA	24	6	140	.....	M	9	55	Extraction	Head caught at inlet.
32	20	1	Justo Minor	ODA	3	1/2	150	.....	M	6 1/2	40	Version	Eclampsia. Nephritis. Autopsy.
33	35	1	Flat Justo Minor	OLA	40	2	160	.....	M	8	52	Craniotomy	High forceps failed. C.V. 8.75 cm.
34	17	1	.....	ODP	12	1	148	.....	M	6.5	49	Forceps	Mother had lobar pneumonia.
35	35	2	.....	OLA	40	1-12	120	.....	M	5	48	Spontaneous	Meconium in liquor amnii. Child died in long first stage.
36	20	1	Normal	OLA	12	4	136	150	M	6	49	Spontaneous	Child died from hemorrhage into the amniotic sac. Cord twice around neck.
37	20	1	Normal	SLA	23	3	144	160	F	8	54	High Forceps	Mother's pulse 140 in the second stage. Child injured in the operation.
38	24	4	Justo Minor	OLA	5	2	160	160	M	5.7	49	Version	Accouchement forcè. Mother has mitral stenosis. Child injured by the operation.

No. of Case.	Age.	Para.	Pelvis.	Diagnosis.	Length of First Stage.	Length of Second Stage.	Heart Tones First Stage.	Heart Tones Second Stage.	Sex.	Weight of Child.	Length of Child.	Method of Delivery.	Cause of Fetal Death and Remarks.
39	37	5	Flat Justo Minor	FLA	36	12	.....	160	M	8	54	Version	Internal manual rotation failed. High forceps failed. Version. Forceps on aftercoming head.
40	18	1	Flat	OLA	48	1½	128	136	M	8	50	Spontaneous	Amniotic fluid and meconium poured from child's mouth when delivered.
41	36	1	.....	CEPH	5	½	130	.....	F	6	49	Version	Dry labor. Hand and foot presented with the head.
42	20	1	.....	ODA	....	4.5	.....	150	M	8.5	51	Spontaneous	Eclampsia. Chronic nephritis.
43	27	1	.....	SCLA	....	10	.....	160	M	9	57	Version	Head caught at inlet.
44	23	1	Normal	ODA	48	2	120	.....	M	7	51	Spontaneous	Child died in the long first stage.
45	26	1	Normal	SLA	6	2	156	156	M	8.5	52	Extraction	Head unable to pass vulva in time to prevent asphyxia.
46	30	1	Normal	Twins OLA	5	1	140	140	M	6.5	50	Spontaneous	First child alive. Second born one hour later with membranes intact. Premature detachment of placenta.
47	30	11	Normal	SLA	12	½	150	70	M	8	52	Spontaneous	Intrauterine asphyxia.
48	19	1	Justo Minor	SDA	16	3	136	.....	F	5.3	48	Extraction	Child died in the first stage.
49	22	1	Justo Major	ODP	28	3	140	146	M	8.25	53	Version	High forceps useless. Head arrested at inlet.
50	17	1	Normal	OLA	8	3	150	100	M	8	51	Version	Prolapse of cord and hand. Child died from pressure on cord.
51	17	1	Justo Minor	OLA	24	18	142	150	M	9	56	Craniotomy	High forceps negative. Version dangerous.
52	34	2	.....	CEPH	...	.....	.....	146	M	9	55	Version	Prolapse of cord. Version. Forceps on aftercoming head. Child died from pressure on cord.
53	20	1	.....	SCLA	60	3	160	.....	M	8.5	55	Embryotomy	Child died from pressure in the long first stage.
54	20	1	Justo Minor	OLA	40	9	.....	160	M	6.5	49	Craniotomy	Fetus died from compression of head in the second stage. Meconium in liquor amnii.
55	36	1	.....	ODA	2	.....	130	.....	F	7.75	51	Forceps	Eclampsia. Chronic nephritis. Accouchement forcè.
56	29	2	Normal	OLA	8	7	156	160	M	8.25	53	Forceps	Uterine inertia in second stage.
57	38	2	.....	OLA	....	.....	.....	.....	F	6.25	49	Spontaneous	Fetal motions active in second stage. Premature detachment of placenta.
58	19	1	Rickety	SCDA	18	3	.....	.....	M	6.25	50	Version	Hydramnion. Child died in thirty minutes.
59	17	1	Normal	ODA	12	4	140	140	M	11	58	Craniotomy	High forceps negative. Head not engaged. Version dangerous.
60	40	6	.....	ODA	14	½	150	120	M	7	51	Forceps	Eclampsia. Accouchement forcè.
61	20	1	Flat	OLA	29	1	140	100	M	7.5	52	Forceps	Prolapsed cord.
62	19	2	.....	SCDA	18	2	160	140	F	6.5	50	Version	Premature rupture of the membranes.
63	24	1	.....	SDA	8	2	132	136	F	7.75	50	Extraction.	Rigid perineum.
64	21	1	Flat Justo Minor	MLA	36	3.5	148	150	F	9.25	54	Spontaneous	Cord wrapped tightly around neck.
65	35	6	.....	SCLP	....	1.5	150	160	M	5.5	49	Version	Placenta previa lateralis. Child died from asphyxia. Autopsy.
66	26	1	Rickety	ODP	48	2	100	.....	F	8.5	51	Forceps	Several attempts to deliver had been made before patient entered hospital. Child killed during operations.
67	30	1	.....	CEPH	36	1.5	160	156	M	7	51	Version	Eclampsia.
68	19	1	Flat Justo Minor	OLA	90	½	160	.....	F	7	54	High Forceps	Incisions of cervix. Long first stage.
69	30	5	Normal	SLA	....	.....	.....	140	M	6	50	Extraction	Autopsy.
70	23	1	Flat Justo Minor	OLA	....	.....	.....	.....	....	....	....	Cæsarian Section	Anchylosis of both hip joints.
71	29	5	Normal	SLA	....	2.5	146	150	M	8.5	52	Extraction	No recorded cause of death.
72	21	1	Justo Minor	OLP	20	1	150	150	M	5.5	49	High Forceps	Accouchement forcè.
73	27	1	Justo Minor	OLA	7	7	160	80	F	9	56	Version	Prolapse of the cord.
74	28	1	.....	SCDP	....	.....	.....	110	F	7.5	51	Version	Prolapse of the right arm.
75	32	2	Normal	ODA	56	½	156	.....	M	8	52	Version	Manual dilatation of the cervix.
76	20	1	Normal	OLA	....	3	144	150	M	9	56	Forceps	Uterine inertia. Mother's pulse 130.
77	19	1	Normal	Twins SLA	....	1	.....	.....	F	5.5	50	Extraction	Premature detachment of placenta of last child.
78	22	1	Normal	OLA	24	1	140	144	M	8	51	Spontaneous	No reported cause of death.
79	19	1	Normal	OLA	36	1½	?	?	F	6.5	49	Spontaneous	Three coils of cord around neck and one around shoulder.
80	22	1	Normal	OLA	9	18	148	130	F	9	56	Forceps	Long second stage. Autopsy.
81	19	1	Rickety	OLP	30	20	.....	140	F	7	....	Spontaneous	No reported cause of death.
82	28	1	.....	.....	24	1	.....	128	F	7	49	Spontaneous	Hydramnion. Artificial rupture of the membranes in second stage. Heart tones became worse soon after. Autopsy.
83	27	2	Justo Major	OLA	0.5	5	.....	130	M	6	....	Spontaneous	Cord 107 centimeters long.
84	18	1	Normal	SLP	6	2	160	156	M	6	52	Forceps	Forceps on the aftercoming head.

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85	25	1	Normal	ODA	12	½	160	.....	M	7.5	...	Version	Eclampsia.
86	30	3	Normal	Twins SLA	5	9	.....	.....	M	6.7	49	Spontaneous	First child alive. Second dead. Placenta expelled immediately. Premature detachment.
87	19	1	Normal	OLA	9	1	142	142	F	6.5	50	Spontaneous	Perineum rigid. Cord around neck and tight. Child died from pressure on cord.
88	33	7	Normal	SLA	6	3	.....	.....	M	10	54	Extraction	Child delivered to navel when attendants arrived. Cord beating feebly.
89	26	2	Flat	OLA	17	8	132	140	M	7	50	Craniotomy	Litzmann's Obliquity. Forceps negative.
90	27	1	Flat Justo Minor	OLA	45	5	128	.....	F	5.5	48	Spontaneous	Left parietal bone depressed.
91	28	5	.....	SLA	4	½	.....	140	M	12	60	Extraction	Fracture of humerus and skull. Dislocation of the neck. Circumference of shoulders 43 cm.
92	32	5	Flat Justo Minor Rick	OLA	6	3	135	135	M	8	51	Craniotomy	Naegele's Obliquity. C.V. 8¾ cm.
93	39	9	.....	OLA	2	½	.....	144	F	7.7	49	Spontaneous	Death due to short cord. Much fresh meconium in liquor amnii.
94	32	5	Normal	Twins ODP	16	4	150	.....	M	5	48	Spontaneous	First child alive. 45 minutes later second child delivered. Hand and foot prolapsed. One placenta.
95	27	3	Justo Minor	SCDP	8	4	150	.....	F	7	54	Version	Operation was performed too late.
96	25	1	Justo Minor	ODP	15	3	144	.....	M	7.2	50	Spontaneous	Premature rupture of the membranes. Child alive until a half hour before delivery.
97	20	1	Normal	OLA	9	2½	144	148	M	6.5	49	Spontaneous	Dry labor. Premature rupture of the membranes.
98	36	7	Normal	MLA	8	9	.....	120	M	9	56	Porro operation	Rupture of the uterus. Craniotomy. Porro. Death of mother.
99	38	10	Justo Minor	OLA	12	1.5	140	130	F	8	57	Craniotomy	Version and forceps negative.
100	25	1	Justo Minor	ODA	15	13	150	150	F	11	54	Craniotomy	Premature rupture of membranes. Hydramnion.
101	24	2	Flat	CEPH	11	17.4	148	148	F	8.5	48	Craniotomy	Child died from pressure in the second stage.
102	36	9	Normal	ODP	14	¾	.....	.....	M	10	54	Spontaneous	Pendulous abdomen. Placenta detached. Child died in three hours.
103	37	9	Normal	SDP	6	1	152	150	M	8.5	49	Extraction	Dry labor. Child gasped a few times and died.
104	34	9	Rickety	OLA	22	1	132	130	M	8.2	55	Version	Litzmann's Obliquity. Velamentous insertion of cord. Child lost in the extraction.
105	30	5	Normal	OLA	10	1	144	.....	M	5	48	Spontaneous	Child died in one hour. Funic souffle.
106	30	4	Normal	Twins ODP	5	23.5	.....	.....	F	7	55	Spontaneous	First child alive. Midwife gave ergot to increase pains. Uterus hard and contracted.
107	36	8	Normal	ODP	....	.....	150	.....	M	8.5	52	Spontaneous	Child died in half an hour. Fresh meconium in the liquor amnii.
108	36	6	Normal	ODA	16	½	120	130	M	9	54	Spontaneous	Child died on the second day of atelectasis pulmonum.
109	40	2	Normal	ODP	7	⅛	160	.....	F	7	54	Version	Prolapse of cord. Braxton Hicks version. Child died in the extraction.
110	22	2	Flat	OLA	12	4	130	150	F	5.7	51	Spontaneous	Premature detachment of the placenta.
111	29	3	Justo Minor	ODA	14	1	156	160	M	8	48	Spontaneous	Meconium in liquor amnii. Child died in three hours.
112	34	12	Normal	MLA	12	2	.....	108	M	7	48	Forceps	Version tried but failed. Child died shortly after birth.
113	30	5	Flat	SCDP	7	2½	138	104	M	6.7	50	Version	Hydramnion. Placenta delivered with child.
114	39	10	Flat	SLA	7	4½	128	140	M	12	56	Version	Hydramnion. Fetal head well ossified. Child died in ten hours.
115	23	1	Flat Justo Minor	OLA	28	13	152	148	M	7	55	Craniotomy	Litzmann's Obliquity. High forceps negative.
116	35	10	Flat	SCLP	11	¾	150	150	M	7.2	51	Version	Fresh meconium in liquor amnii. Braxton Hicks version. Child died in six hours.
117	34	6	Normal	OLA	....	3	165	.....	F	7	52	Version	Placenta previa lateralis. Hands and feet present with the head. Prolapse of the cord.
118	20	2	Flat Justo Minor	ODP	12	¾	140	158	M	6	50	Spontaneous	Cord once around neck.
119	23	3	Normal	SCDA	35	1½	160	160	F	5	49	Version	Long first stage. Version easy. Child died the following day.
120	38	12	Rickety	CEPH	7	19	126	120	M	8	53	Craniotomy	Naegele's Obliquity. Version and high forceps negative. Fracture of left parietal bone.
121	36	8	Normal	OLA	17	5	130	130	F	9	53	Forceps	Low forceps after five hours in second stage. Enormous angioma of child.
122	26	6	Normal	SCLA	36	.....	142	.....	F	7.5	50	Version	Braxton Hicks version.
123	31	6	Flat	ODA	9	7.7	150	160	M	7.5	50	Evisceration	Hydramnion. Pendulous abdomen.
124	19	1.	Justo Minor	ODA	7	14.5	128	.....	F	7.5	51	Craniotomy	Hydramnion. Prolapse of cord. Version negative.
125	24	2	Flat	OLA	17	1.6	150	150	M	5.5	48	Extraction	Cause of death unknown.

No. of Case.	Age.	Para.	Pelvis.	Diagnosis.	Length of First Stage.	Length of Second Stage.	Heart Tones First Stage.	Heart Tones Second Stage.	Sex.	Weight of Child.	Length of Child.	Method of Delivery.	Cause of Fetal Death and Remarks.
126	38	7	Flat	SDA	....	½	134	140	M	10	154	Spontaneous	Premature rupture of the membranes. Child died in thirty minutes.
127	21	1	Flat Justo Minor	SLP	4.5	4.5	140	140	M	9	51⅛	Extraction	Trachea full of mucus. Difficult extraction. Head caught at inlet.
128	32	1	Normal	OLA	8.8	8.7	135	150	F	7.75	51	Spontaneous	Child died in six hours. Cord three times around neck. Pains almost continuous in the second stage.
129	32	1	Rickety	OLA	12	.7	140	60	M	7	51	Forceps	Marked moulding of head. Very difficult extraction. Child died in labor.
130	25	1	Normal	OLA	20.7	.3	150	.....	M	6.75	49	Forceps	Manual dilatation of cervix. Uterine inertia.
131	35	6	Flat	SDA	15	7	140	140	M	11	51	Extraction	Breech impacted. Forceps on aftercoming head. Heart beat for a short time.
132	28	1	Justo Minor	ODA	10	4	130	80	F	6.2	49	Version	Prolapse of cord. Manual dilatation.
133	23	1	Justo Minor	ODA	9	.7	146	90	M	7.5	51	High Forceps	Prolapse of cord. Version negative.
134	29	5	Normal	ODP	8	9	130	.....	M	8.7	53	Version	Low forceps negative. High forceps negative. Sutures overlapping. Depression of frontal bone.
135	40	7	Normal	Twins OLA	17	9	.....	140	F	6.7	48	Spontaneous	First child alive. Second born nine hours later.
136	28	2	Justo Minor	OLA	20	14	144	140	F	8.5	59	Evisceration	Head would not enter inlet. High forceps negative. Cleidotomy.
137	19	1	Normal	OLA	13	1.5	144	144	M	7.5	53	Spontaneous	Coil of cord prolapsed at the side of head.
138	26	3	Flat Justo Minor	CEPH	2.3	8	130	138	M	10.7	56	Craniotomy	Forelying cord. Meconium in liquor amnii. Threatened rupture of uterus. Palate perforated
139	35	3	Normal	OLA	15	3	144	.....	M	10.3	58	Extraction	Patient in collapse. Rupture of uterus and bladder. Mother died in half an hour.
140	27	3	Normal	Twins OLA	....	3	.....	.....	M	7	51	Spontaneous	First child alive. Second born in half an hour. Placenta and membranes intact. Premature detachment.
141	26	6	Normal	OLA	....	.....	.....	?	M	8	50	Spontaneous	No cause of death discovered.
142	34	9	Normal	OLA	6	5.5	140	.....	M	12	58	Version	Weak pains in the second stage.
143	27	2	Normal	SDA	33	4	130	.....	M	9	51	Craniotom	Prolapsed cord. Manual aid.
144	26	6	Flat Justo Minor	ODA	11	3	140	.....	M	8.5	52	Spontaneous	Prolapsed cord. Asphyxia.
145	40	3	Normal	ODP	11	15	138	.....	M	9	50	Craniotomy	Large caput. High forceps negative. Double cleidotomy.
146	39	7	Normal	OLA	4	3	130	60	F	7	53	Spontaneous	Cord three times around neck. Meconium in liquor amnii. Child lived five minutes.
147	27	3	Justo Minor	SCDP	8	4	150	150	M	8	52	Version	Great difficulty with head at inlet. Smellie Veit and Kristeller methods.
148	25	1	Justo Minor	ODP	15	3	136	144	M	7.3	53	Spontaneous	Cord twice around neck. Child alive until half an hour before delivery. Premature rupture of membranes.
149	19	1	Normal	OLA	9	1	142	.....	F	6.5	50	Spontaneous	Cord once around neck, tight. Meconium in liquor amnii. Perineum rigid. Child killed by pressure on cord.
150	30	3	Justo Minor	Twins SLA	6	3	.....	.....	M	6.7	51	Spontaneous	Second child born two and a half hours after first. Placenta expelled immediately.
151	33	7	Normal	SLA	7	2	.....	130	M	10	51	Spontaneous	Child born to navel when attendant arrived. Fain pulsation of cord.
152	27	1	Normal	ODA	18	6	.....	130	M	6.3	48	Spontaneous	Old ventrofixation for retroversion. Cervix high and posterior.
153	30	0	Normal	OLA	2	.5	.....	144	F	7.7	52	Spontaneous	Short cord once around neck, tight. Meconium in liquor amnii. Child died twenty minutes before delivery.
154	33	0	Justo Minor	SCDA	....	.....	140	130	M	7	52	Version	Prolapse of cord. Version. Spontaneous delivery.
155	35	4	Flat	SDA	15	3	140	140	F	9.3	55	Spontaneous	Shoulders impacted in pelvis. Bisacromial circumference 30 cm.
156	22	1	.....	ODP	5	2	.....	144	M	5	48	Spontaneous	Rapid second stage. Pains strong and continuous. Child died in eight hours.
157	25	1	Flat Justo Minor	OLP	10.5	.5	146	136	F	7.5	50	Forceps	Manual dilatation. Child two weeks overtime and lived four hours.
158	22	1	Flat	CEPH	50	6.5	148	148	M	6	50	Forceps	Deep transverse arrest. Meconium in liquor amnii. Incomplete rupture of the uterus. Mother died.
159	34	6	Rickety	ODP	12	6.5	144	144	F	7.5	51	Craniotomy	Naegele Obliquity. Version negative. Osteomalacia.
160	25	3	Flat	OLA	14	1.5	150	70	M	8.7	54	Forceps	Meconium in liquor amnii. Child died from pressure.
161	27	3	Normal	SCDA	16	2	Slow	.....	F	6	51	Version	Prolapse of cord. Large retroplacental blood clot.
162	26	3	Normal	ODA	55	7	142	140	F	9	51	Craniotomy	Prolapse of cord, at first pulsating freely. Later no pulse.
163	25	4	Justo Minor	ODA	2.5	6	.....	128	M	10.5	52	Craniotomy	Naegele Obliquity. Threatened rupture of the uterus. Forceps negative.

No. of Case.	Age.	Para.	Pelvis.	Diagnosis.	Length of First Stage.	Length of Second Stage.	Heart Tones First Stage.	Heart Tones Second Stage.	Sex.	Weight of Child.	Length of Child.	Method of Delivery	Cause of Fetal Death and Remarks.
164	21	1	Flat	ODA	25	5	142	140	M	5	50	Spontaneous	Heart tones ceased one hour before delivery. Liquor amnii bloody.
165	26	2	Normal	ODA	10	2	140	140	M	8.5	53	Spontaneous	Cord around neck tight. Heart tones inaudible one half hour before delivery.
166	24	1	Normal	ODP	10	4	135	.....	M	7	50	Forceps	Forelying cord. Reposition negative. Difficult forceps.
167	28	4	Rickety	OLA	10	1	140	146	F	7	52	Spontaneous	Prolapse of the cord.
168	25	4	Justo Minor	ODA	12	.5	.....	.....	F	10	50	Forceps	Bisacromial circumference 41 cm. Difficult extraction of the shoulders.
169	19	1	Flat Justo Minor	SDA	19	1.5	136	.....	M	8.3	51	Extraction	Child lost in the extraction.
170	33	5	Rickety	ODP	....	.....	135	145	M	8.5	50	Version	Prolapse of cord. Pulsation of cord ceased during version.
171	32	1	Flat Justo Minor	OLP	24	8	144	168	M	8.3	55	Craniotomy	Posterior parietal bone presented. Prolapse of cord. Head arrested at inlet.
172	24	1	Justo Minor	OLA	41	4	156	132	M	9.3	55	Forceps	Head dolicocephalus. Mother's pulse 120.
173	22	1	Flat	OLA	1	1-6	.....	160	F	6.3	49	Spontaneous	Cord once around neck. Precipitate labor. Child born with mother standing.
174	30	1	Normal	OLP	....	.....	.....	132	M	6.5	50	Spontaneous	No record as to child's death.
175	28	2	Flat	SCDA	12	.5	150	150	M	9	54	Forceps	Premature rupture of membranes. Colpeurynter. Head arrested at inlet by osteoma on promontory.
176	31	4	Normal	OLA	18	7	150	150	M	8.5	52	Forceps	Uterine inertia in second stage. Child gasped and died.
177	28	2	Rickety	FLA	24	9	.....	150	M	10	58	Forceps	Manual rotation negative. Threatened rupture of uterus. Mother's pulse 148. Child lived eighteen hours.
178	25	2	Normal	OLA	9	.....	144	.....	F	8	51	Version	Placenta previa centralis. Braxton-Hicks version. Slow extraction.
179	23	1	Flat	ODP	....	9	.....	.....	M	7.7	50	.....	Placenta previa centralis. Colpeurynter pushed head through uterus. Mother and child died.
180	27	3	Normal	ODP	....	4	.....	.....	M	9	52	Laparotomy	Midwife gave ergot to hasten labor. Rupture of uterus. Child in peritoneal cavity. Mother died of sepsis.
181	18	1	Rickety	MLP	12	8	150	156	M	8.5	52	Craniotomy	Manual rotation negative.
182	40	1	Flat	CEPH	48	18	160	80	M	9	56	Craniotomy	Prolonged second stage.
183	24	2	Flat	ODP	14	6	120	80	F	8.5	50	Craniotomy	Manual rotation negative. Version dangerous. Craniotomy very difficult.
184	26	2	Normal	ODA	12	3	138	.....	M	8.7	54	Version	Head remained high. Attempted version. Cord caught in version slings and child died.
185	28	3	Flat	SCDA	7	.7	144	150	F	9.3	54	Decapitation	Membranes ruptured in first stage. Shoulder became impacted. Unable to perform version.
186	18	1	Normal	ODA	12	3	130	110	M	7.5	50	Craniotomy	Placenta previa marginalis. Acute anemia Craniotomy of child. Mother died in one hour.
187	28	4	Normal	ODA	9	.5	150	.....	M	8	54	Version	Placenta previa marginalis. Braxton Hicks version. Slow extraction.
188	30	4	Rickety	ODP	....	10	140	?	M	8.5	52	Craniotomy	Hand in nape of neck. Several attempts already made at version and forceps. Cleidotomy.
189	20	1	Rickety	OLA	14	6	150	150	M	8	54	Craniotomy	Rickety negress. Naegele Obliquity. Threatened rupture of uterus. Forceps useless.
190	24	2	Justo Minor	ODA	18	7	132	140	F	8.7	54	Craniotomy	Uterine inertia in second stage. Mitral stenosis Head high above inlet. Lower uterine segmen thinned. High forceps negative.

The following is a brief summary of the autopsies made on the bodies of 33 stillborn children.

Case 1. Diffused subpleural ecchymoses, especially anteriorly and laterally in both lungs. Alveoli filled with bloody serum. Slight crepitation. Many air cells collapsed. Several hemorrhages in both lungs. Numerous punctate hemorrhages beneath the capsule of liver. There is a large clot and a moderate amount of fluid blood beneath the dura mater on the entire right side of skull. The fluid blood spurted out when released. Superficial hemorrhage in cerebellum.

Case 3. Abrasion of skin over occiput and right temporal region. Subpleural hemorrhages. Large hemorrhage in interlobar fissure of left lung. Both lungs hemorrhagic and congested. Spleen congested. Large cephalhematoma over right parietal bone. Brain soft. In posterior and middle fossa of skull is considerable blood. Subdural hemorrhage over parietal bone of left side.

Case 5. Right lung poorly expanded. Left lung less so. Subcapsular hemorrhage in liver. Patent ductus arteriosus and foramen ovale.

Case 9. Three forceps marks on scalp. Lungs congested and hemorrhagic. Over both parietal bones is a thin layer of blood. Frontal bone is fractured over an area of one and a half inches. Dura mater beneath is congested. Fracture of roof of left orbit. Hemorrhage in Sylvian fissure. One ounce of blood in lateral

ventricles. Slight hemorrhage in floor of fourth ventricle.

Case 12. Considerable mucus in larynx and bronchi. Dark and bloody areas in right lung. Both lungs float. Large blood clot extends nearly through the right lung. Kidneys are congested and hemorrhagic. Liver hemorrhagic and the capsule is stripped up in places.

Case 13. Hemorrhage in cellular tissue of buttocks and thigh. Hemorrhage in lower third of right sternomastoid muscle. Hemorrhage on surface of brain, at junction of middle and posterior thirds, near longitudinal fissure. A large quantity of blood under right parietal bone. Lungs collapsed; do not float. Slight hemorrhage under capsule of liver and kidneys.

Case 18. Lungs collapsed and full of blood. Large amount of blood in scalp tissue. Subdural hemorrhage on right side. Brain soft. Mass of blood at base of brain. Lateral ventricles free.

Case 22. Small blood clot in mediastinum. Ecchymoses of bladder. Large hemorrhage in anterior parietal region under scalp. Small hemorrhage between layers of tentorium and in falx cerebri. Pancreas and kidneys congested.

Case 27. Hemorrhagic diathesis. Multiple subserous hemorrhages. Effusion of blood beneath scalp. Petechiæ under pia mater. Blood clot between falx cerebri and hemisphere of either side. Pericardial ecchymoses.

Case 30. Blood extruding from both nostrils. Edema of lungs dark red ecchymoses. Partial atelectasis. Over right frontal eminence is an extravasation of blood in scalp. Hemorrhage in both posterior fossæ of brain, beneath tentorium cerebelli. Ecchymoses under skin, at various points.

Case 31. Head moulded. Considerable blood in both pleuræ. Pharynx contains mucus. Subpleural hemorrhages. Lungs are atelectatic. Spleen congested. Liver hemorrhagic. Dark blood clot extending full length of brain on right side between dura and pia mater.

Case 32. Thymus enlarged. Hemorrhagic infarcts of both lungs. Subpleural ecchymoses. Pulmonary atelectasis. Acute endocarditis of right heart.

Case 35. Congenital atelectasis of both lungs. Liver enlarged. Free blood beneath capsule. Blood oozes on section. Free blood below scalp. Brain edematous.

Case 39. Complete atelectasis of both lungs. Hematothorax; hemato-pericardium; hematoperitoneum. Passive congestion of liver, spleen and kidneys. In suboccipital region of brain is a mass of dark clotted blood (extra dural), size of small walnut. Vessels over surface of brain congested. Outside of skull in same region, is a mass of clotted blood. Dark fluid blood over superior and posterior surface of both parietal bones.

Case 43. Lower border of lungs congested. Many collapsed areas. Liver hemorrhagic. Small amount of blood in pericranial tissues. Free blood in cranial cavity over posterior portion of brain. Free blood at base of skull. Subdural hemorrhages.

Case 44. Thymus extends to the diaphragm. Lower lobes of lungs congested. Cerebral vessels congested. Subpericardial hemorrhage. Foramen ovale patent.

Case 49. Depression over right parietal bone. Free blood in pleural cavities. Free blood in pericardial cavity, lungs, spleen, gall-bladder and pancreas. Lungs atelectatic.

Case 52. Considerable free blood in abdominal, pleural and pericardial cavities. Both lungs collapsed. Eccyhmoses anteriorly. No crepitation. Subpericranial hematoma. Meninges covered with blood. Hemorrhage in kidneys. Liver diffusely hemorrhagic.

Case 56. Right lung feebly crepitant. Posterior border bloody. Alveoli collapsed. Pyramids of kidneys much congested. Liver, spleen and thymus markedly congested.

Case 57. Lungs collapsed. Slight crepitation. Frothy blood and green serum exude on cut section. Patent foramen ovale. Atelectasis of lungs. Passive congestion of kidneys.

Case 61. Atelectasis of both lungs. Hemorrhages beneath capsule of kidneys. Cortex and medulla show congestion.

Case 65. Left leg bluish. Nearly whole of upper surface of right lobe of liver is covered with a clot raising the capsule. Kidneys congested. Supra-renals congested. Both lungs congested at bases. Hemorrhage in right lung. Subpleural ecchymoses. Marked edema of brain. No hemorrhage.

Case 68. Hare lip. Superitoneal ecchymoses. Perforation of Meckel's diverticulum. Free meconium in peritoneal cavity. Large amount of fluid and clotted blood on right side of brain (subdural). Large blood clot over frontal lobe.

Case 69. Parietal bones depressed. Irregular hemorrhage in scalp. Hemorrhage on surface of brain, subdural and at base. Blood in right lateral ventricle. Intestines congested, little meconium. Hemorrhage beneath capsule of lobus quadratus. Spleen congested. Left lung dark from hemorrhage into its tissues. Neither lung crepitant.

Case 73. Dark fluid blood in both lungs. Foramen ovale patent. Passive congestion of the lungs, liver and spleen.

Case 76. Bruise over malar region on right side of face. Kidneys congested. Head markedly moulded. A large subdural hemorrhage on left side of surface of brain. Excess of fluid in lateral ventricles. Lungs non crepitant. Considerable mucus in trachea and throat.

Case 80. Bruise on right side of head. Brain firm. Vessels much congested. Hemorrhage at base of brain, extending over pons and medulla. Extra dural hemorrhage beneath the occipital bone. Spleen congested. Pyramids of kidneys nearly black. Lungs collapsed.

Case 83. Lungs congested. Hemorrhages in bases. Subpleural ecchymoses. Liver enlarged. Subcapsular hemorrhage in right lobe. Considerable yellow fluid in peritoneal cavity.

Case 175. Subcutaneous ecchymoses in various parts of the body. Lungs congested, no hemorrhages. Yellow fluid in peritoneal and pleural cavities. Liver

and kidneys covered by punctate hemorrhages. Right parietal bone depressed by groove one inch wide and two and a half inches long. No fracture. Subdural hemorrhage running along entire right side of brain. Small clot on base. Pia mater apoplectic. Lateral ventricles filled with a small amount of fluid blood. Brain tissues edematous. Few cortical hemorrhages.

Case 176. Intense congestion of kidneys. Supra-renals congested. Anterior border of right lobe of liver congested. Lungs atelectatic. Lungs do not float. Meninges markedly edematous, especially over temporo-sphenoidal lobes. Vessels around medulla and cerebellum congested. Hemorrhage in tentorium cerebelli.

Case 177. Child had several spasms before death. Autopsy on head only permitted. No fracture or depression of bones of skull. Pia mater congested. Base of skull filled with dark fluid blood on both sides, extending up as far as the Sylvian fissure on right side. Lateral ventricles filled with blood tinged serum. Brain tissue soft, exceedingly friable and edematous. Choroid plexuses congested.

Case 180. No subcutaneous ecchymoses. Intense congestion of pyramids of both kidneys and supra-renals. Lungs are atelectatic. Subpleural ecchymoses. There is a hemorrhage at the base of the brain on both sides of skull. Congestion of pia mater and choroid plexuses. Lateral ventricles distended with bloody serum. Brain tissue soft and friable. The changes in the brain are due to head pressure by the uterine walls.

Case 187. Slight ecchymoses on lower limbs. Edema of kidneys. Lungs filled with greenish fluid. Subpleural ecchymoses. Edema of brain. No hemorrhages. Fluid in pleural cavities slightly tinged with blood.

The fetus maintains its life in utero by a constant interchange of gases and nutriment through the medium of the placenta. Pulmonary respiration is held in abeyance and the fetal lungs contain only sufficient blood to aid in the normal development of the organs. The fetus is physiologically apnœic. Only when the respiratory center in the medulla is irritated by a lack of oxygen in the fetal blood are the lungs called into action. Numerous experiments have been made to test the truth of this statement. Henricius exposed a fetal dog by abdominal section, but did not remove it from the uterus. He then forced a solution of ammonia and water into the nose with a pipette. There was a strong reaction of the nose and surrounding skin. Then the mouth was opened and the solution poured into the throat. The animal made swallowing efforts and protruded the tongue, but made no effort to breathe. Only after taking the animal out of the uterus was respiration established. It was found to be impossible to maintain apnœa after the animal was wholly or partially removed from the uterine cavity. The contraction of the uterine walls interfered with the placental circulation.

At the present time, while many theories have been given by various authors as to the real cause of fetal respiration, it is generally conceded that the irritation of the respiratory center is due to a lack of oxygen and excess of carbon dioxide in the fetal blood, and this condition is generally caused by some interference with the placental or funic circulation.

The pathology of fetal death during labor is divided into the changes produced by pure asphyxia, and those produced by the mechanism of labor or operative delivery. Interference with the placental circulation finally results in an increasing venosity of the fetal blood that irritates the center in the medulla, and the fetus reacts by breathing. As the chest expands, liquor amnii, blood, or mucus are drawn into the larynx and bronchi; the pulmonary vessels dilate, and receive a larger portion of blood from the right ventricle. The descending aorta receives a correspondingly lesser quantity through the ductus Botalli. The tension in the arterial system falls, and the placental circulation weakens. Each attempt at respiration increases the difficulty, until the center loses its activity and breathing ceases. The fetal heart beats for a few minutes, and the child becomes still.

If the obstruction is speedily removed, the disturbance may subside, and, according to Schultze, intra-uterine apnœa will return. The respiratory center and the pneumogastric nerve become fatigued through constant irritation, the lungs become inactive, and the pulse increases in frequency. The tension in the descending aorta and umbilical arteries rises, the placenta fills with blood, and its circulation becomes normal.

Sudden death can and does occur without intra-uterine respiration, and the child is born still in apnoea. Severe compression by the forceps, extraction through a contracted inlet, or a hemorrhage at the base of the brain, involving the medulla, will so injure the respiratory center that it is unable to react to stimuli and cause premature respirations.

On the other hand, a slow increase in the impoverishment of oxygen will irritate the medulla continually, but not to such an extent as to produce respirations. By the time that the lack of oxygen is sufficient to act as a stimulus, the irritability of the centre is so decreased that it fails to react.

Owing to the delicate condition of the blood-vessels of the new born child, we would naturally expect hemorrhage to play an important part in the pathology of asphyxia. The meninges, lungs, liver, kidneys, and suprarenals are commonly the seat of congestions or of actual hemorrhages. The more gradual the asphyxia, the more frequently do we find congestion and edema. In a sudden arrest of the funic circulation, as from prolapse of the cord, hemorrhages, and extravasations of blood and bloody serum in the various tissues of the body, are common. In an apparently normal and spontaneous delivery, enormous hemorrhages may be found.

If the fetus dies in utero without respiratory efforts, a general atelectasis will be found. The blood is dark and fluid. There is engorgement of the right heart, the sinuses of the dura, and the vessels of the pia mater. Subcapsular hemorrhages of the liver are not rare. The sudden increase of pressure in the hepatic vessels is due to the overfilling of the right ventricle and inferior vena cava by the efforts at premature respiration. Serum is present in the pleural, pericardial, and peritoneal cavities. The lungs contain little blood, except what may be squeezed from the larger arteries.

If respirations have taken place, the subpleural ecchymoses of Roederer are extremely common. The air passages are filled with liquor amnii, particles of vernix caseosa, or lanugo hairs. The air vesicles may be filled with a greenish fluid which can be pressed out from a cut section. A variable amount of air will often be found present in the lungs. This air is introduced into the uterus during an examination or operation. Fluids may also be forced through the Eustachian tubes into the middle ear, and produce a hyperemia of the parts. A portion of meconium has usually been forced from the intestines by the increased peristalsis, and is found in the liquor amnii, lungs, or rarely, in the stomach.

The more common pathological findings occur in bodies of children who have been injured by the mechanism of labor or by an operation. In a generally contracted pelvis, the fetal head is subjected to a long-continued, generalized pressure, while in the flat or rachitic variety, the projection of the sacral promontory causes the spoon-shaped depressions or fractures of the posterior parietal bone with cerebral hemorrhage below the seat of injury. The application of the forceps to the head at the pelvic inlet leads to fractures, hemorrhages, and lesions of the soft tissues. The same can be said of the extraction of the after-coming head caught at the inlet. It requires considerable obstetric judgment to determine whether a child will suffer more injury from compression by a deformed pelvis than by a forceps operation. The presence of contusions, fractures, and dislocations in other portions of the body, combined with serious lesions, in the form of hemorrhages in the vital organs, and atelectasis of the lungs, is frequently sufficient to turn the scale against the child.

Death of the mature fetus in labor may be ascribed to one or more of the following principal conditions:

Precipitate Labors. Excessive and violent uterine action is seen when the obstruction to the passage of the fetal head is not abnormally great, and when the uterine muscle has not become exhausted by previous long and difficult labors. Either the fetus is small, or the passages are relaxed and easily distensible, and the child is suddenly expelled with great force into the world. The powers of labor may be violently aroused by an early rupture of the membranes, or other local irritation, or by the administration of drugs, notably ergot and quinine. If the uterine contractions are continuous during the latter part of the second stage, the child is likely to become deeply asphyxiated, or perish. The injuries received by the child in being precipitated to the floor are exaggerated. Outside of bruises and contusions, few children suffer from these injuries. While the cord is often torn, hemorrhage from it is the exception. Only one mother was classed as precipitate in this series, and in her case the pains were violent and prolonged.

Prolonged Labor. The evil effects of prolonged labor, to both mother and child, are well known. Prior to the rupture of the membranes, the fetus can safely endure tedious labor for a considerable length of time. Tarnier reported 133 such cases when the first stage lasted from 24 to 60 hours, and only eight children were born still. With the escape of the liquor amnii, however, time becomes an important element, and the fetus soon suffers from the effect of direct intra-uterine pressure. The great danger of premature rupture of the membranes, and its resulting rigidity of the cervix, is shown by the fact that it occurred in 96 of my cases (50.57 per cent). Uterine inertia is especially harmful when the head is well down on the perineum and the body partially escaped from the uterine cavity. The farther the child is expelled from the uterus, the greater is the muscular retraction of its walls, and the more urgent is the indication for immediate delivery.

The normal length of the second stage is difficult to determine, as the conditions influencing fetal life are so varied. It depends upon the size, vitality, and position of the child, the pelvic passages, the powers of labor, and the degree of intra-uterine pressure. The length of labor that the individual fetus can safely endure must be determined by frequent auscultation of the heart tones, and this stage should be terminated when evidence of threatened asphyxia presents. We would naturally expect this stage to last longer in a generally contracted or rachitic pelvis than in a normal or justo major one. The fetal head passing through the pelvis as a face or brow will require more time than would an occiput anterior. The rule to interfere, after a certain number of hours have passed, regardless of the conditions or resistances to be overcome, is a hazardous one. The condition of the child and mother gives the indication for operative delivery, not the element of time. Taking four hours as the usual length of the second stage, we find 32 mothers (16.84 per cent) had prolonged labor. Of this number, 18 children died as the direct result of intra-uterine pressure.

Size of the Child. The size of the child adds to the difficulty of labor. Although dystochia from this cause is dependent upon the relation of the head and shoulders to the pelvis, still large children usually require longer and harder labors. Generally, a child weighing eight pounds or less will not cause dystochia, from size alone, in a normal pelvis, but one of greater development will meet with more or less resistance. If the pregnancy is prolonged, the head becomes larger and harder, and many children are lost as a result of lack of moulding, of the tendency of the occiput to rotate posterior, of the various deflexion attitudes, as well as the difficult and dangerous deliveries by the forceps. If the shoulders are of great size, the child may be lost by excessive traction on the neck. While haste may be indicated because of threatened asphyxia, it is better to wait for labor pains, to perform Kristeller expressions, and, if necessary, to do an episiotomy, than to exert too much traction on the head and neck. In 6 cases of this series, the shoulders were enlarged so that cleidotomy became necessary. One child measured 43 centimeters around the shoulders and weighed 12 pounds; another measured 41 centimeters and weighed 10.5 pounds. Three children weighed 12 pounds and were the heaviest of the series. One hundred weighed less than 8 pounds; 54 weighed between 8 and 9 pounds; 24 from 9 to 10 pounds, and 16 weighed over 10 pounds. Of these 16 children, with 3 exceptions, all the mothers were multiparæ.

The size of the child is also influenced by its sex, boys being heavier and larger than girls. Of the present series, 129 (67.89 per cent) were boys. Of the 15,542 stillbirths reported at the Chicago Health Department, 8,934 (57.50 per cent) were males. Schultze, from tables of nearly 4,000,000 deliveries in Germany, reported one death in 29 male, to 35 female, births.

Pelvic Deformity.

TABLE OF PELVES.

Description	Number of Cases	Percentage
Normal	80	47.32
Generally contracted	30	17.84
Simple flat	27	15.94
Rachitic	14	8.26
Flat, generally contracted	16	9.46
Generally enlarged	2	1.18
Not recorded	21	.....

One of the principal causes of death in labor is due to deformity of the pelvis, and it is interesting to note that 89 pelves (52.68 per

cent) were classified as deformed and interfering with the normal mechanism of labor. There were but 19 spontaneous deliveries. Of the 80 normal pelves, there were 20 malpresentations, 14 being breech labors.

Williams claims that a spontaneous delivery may be expected in from 75 to 80 per cent of all cases of deformed pelves, and that of the operative cases, radical surgical procedures will be necessary in one-third, and the other two-thirds may be terminated by forceps, version, or craniotomy on the dead child. Baisch, from Döderlein's clinic, reports a fetal mortality of 5.4 per cent in deformed pelves, with from 70 to 80 per cent of spontaneous deliveries by following out the more expectant line of treatment. In the clinics of Fritsch, Crobak and Braun, who freely employed premature labor, high forceps, and prophylactic version, the fetal mortality was 13.2, 18.2 and 34.3 per cent, respectively. The percentage of spontaneous labors in these clinics were 66, 64.5, and 37, respectively. The fetus is better able to stand a moderately prolonged pressure by a deformed pelvis than the sudden manipulation of high forceps or prophylactic version. The injuries received by the head at the inlet are frequently mortal, whether caused by the forceps or in extraction by the breech. In 19 out of 65 cases, where extraction was made on the breech, the head was caught at the inlet and the child lost. In 13 cases, the high forceps were used at or above the inlet without result, save that of further injuring the fetus, and making craniotomy a necessity. In 6 other cases, the high forceps were instrumental in delivering a dead child. Autopsies held on these children showed almost uniformly large hemorrhages of the brain and frequent fractures of the skull. Many children are lost in labor because extraction *per vias naturalas* is impossible, or causes mortal injury. The performance of premature labor, pubiotomy, and Cæsarian Section, when the indications are strictly drawn, will result in greatly lowering the fetal mortality. Pubiotomy will be especially useful in the cases seen for the first time in labor where, because of deformity, the alternative is craniotomy on the living child, and the conditions for Cæsarian Section are absent.

TABLE OF PRESENTATIONS AND POSITIONS.

Diagnosis	Number of Cases	Percentage
Occipito læva anterior	65	34.25
Occipito dextra anterior	28	14.74
Occipito dextra posterior	24	12.63
Occipito læva posterior	6	3.16
Brow presentations	3	1.68
Face presentations	5	2.63
Breech presentations	29	15.26
Oblique presentations	21	11.05
Unclassified	9	4.74
Twin pregnancies	10	.....

Ninety-three children presented by the vertex, with the occiput anterior, while 30 occiputs were found posterior. Of the latter, 12 rotated directly posterior, and were delivered in that position. In 18 cases, the occiput rotated under the os pubis.

The series shows 29 breech presentations and 65 extractions by the breech. Twenty-nine of these 65 pelves were deformed, showing the great value of accurate knowledge of measurements of the head and pelvis before extraction is attempted. Early rupture of the membranes, which occurred in 21 breech cases, is to be prevented by every possible means. For this purpose, the use of Karl Braun's colpeurynter, and an elevated position of the pelves, are useful. Complete dilation of the cervix and perineum, and the application of pressure through the abdominal wall during extraction, are necessary adjuncts in the successful treatment of breech labors.

Of 21 oblique presentations, the fetal heart was irregular in 4, and could not be heard in 7 cases prior to the version. In 10 cases, the heart tones were heard normally, but the child was lost from other causes. Ten cases were complicated by deformed pelves. The presence of oblique presentations should suggest the likelihood of pelvic deformity, premature rupture of the membranes, and prolapse of the cord. It is a good rule, in these cases, not to allow the uterus to retract firmly about the fetal body in a transverse position. Either the breech or head should present. A cephalic version, performed in the first stage, when the membranes rupture, may be moderately easy, and this will avoid a more difficult version later on. The injection of saline solution to replace the amniotic water, if retained, by a perforated metreurynter, will serve to maintain

mobility of the fetus until the conditions for extraction are present.

Of the 8 face and brow labors, only one was spontaneous. The pelvis was deformed in 5 cases. Version was done 3 times. Threatened rupture of the uterus complicated 3 cases. One mother, whose uterus ruptured in labor, died later after a Porro.

Cord Around the Neck. The cord was found around the neck in 14 cases (7.3 per cent), the greatest number of coils being 3. Coiling of the cord around the neck or body is serious only when associated with relative shortness. Premature detachment of the placenta and rupture will result in the child's death, unless it is rapidly delivered.

Prolapse of the Cord. Twenty children died from pressure of a prolapsed cord. Many of them were lost in the extraction through a deformed pelvis, as only 8 mothers had normal passages. Ten pelves were generally contracted, 3 being also flat. The fetus presented once by the breech, 4 times by shoulder, and 15 times by the head. Early diagnosis is important in treating this complication. The etiological factors should be kept in mind, and frequent auscultation of the heart tones made in all cases where the presenting part does not accurately fit the inlet.

Dry Labor. The early escape of the amniotic fluid is a serious loss to the fetus. Not only is the progress of the first stage interfered with, but the fetus suffers from direct uterine pressure. The localized pressure of the cervix on the head may induce congestion, edema, and even hemorrhage of the brain. The violent contractions that are common in this condition are harmful alike to both mother and child. There were 14 cases of dry labor in this series, in which the uterine pressure was too great for the child to withstand. If it is possible to insert a metreurynter between the cervix and the presenting part of the fetus, saline solution may be injected into the uterine cavity when its walls are relaxed, under chloroform, if necessary, and retained by means of the bag. By this method, it may be possible to avoid the dangers of a dry birth.

Premature Detachment of Placenta. Premature detachment occurred 10 times. In 7 cases, the second twin was born dead, and the placenta expelled immediately. According to Spiegelburg, in 80 per cent of twins, the second child follows the first within 1 hour, and if the second delivery is delayed, the membranes should be ruptured and uterine massage applied. If the child is in danger of asphyxia, podalic version should be done at once. Of the 3 single births, the deliveries were spontaneous, and the mothers suffered no ill effects from the accident.

The placenta was inserted in the lower uterine segment in 6 cases. In 1 the metreurynter had forced the head through the uterine wall, and both mother and child died. In another, the patient, a young girl, was allowed to become exsanguinated before her condition was discovered, and she died 1 hour after delivery had been effected by craniotomy. Asphyxia in these cases is frequently caused by the acute anemia of the mother, and the watchword should be to save every drop of blood.

Rupture in the uterus occured 5 times, and in each case both mother and child perished. Two cases were neglected, and came under observation late in labor. These 5 deaths, added to that from placenta prævia, constitute the maternal mortality of the series.

TABLE OF DELIVERIES.

Spontaneous	53	Version, negative	12
Extraction	50	Craniotomy	33
Low forceps	23	Cæsarian section	1
Forceps on after-coming head	3	Porro operation	1
		Accouchement forcé	18
Forceps, negative	6	Manual dilatation	13
High forceps	6	Metreurynter	4
High forceps, negative	13	Cervical incisions	1
Version	34	Evisceration	2
Braxton-Hicks version	6	Decapitation	2

In order to avoid as far as possible the death of the child in labor, it is necessary that the attendant should be familiar with the numerous conditions present at the onset of labor that may jeopardize its safety. These include the presence of pelvic deformity, the presentation and position of the fetus, the presence of twins, hydramnion, placenta prævia, eclampsia, and the physical condition of the patient. Many of these evils can be eliminated if the patient will put herself under medical care early in the pregnancy, and this fact is being more appreciated by the laity. By reason of a

careful ante partum examination, the attendant is made cognizant of the abnormal conditions present, and if they cannot be remedied, he will be prepared for the various complications that are apt to follow.

The early detection of threatened asphyxia in labor is only possible when frequent auscultation of the fetal heart is made. The disturbance of the heart is the best evidence we have of danger to fetal life. Although the increased activity of the fetal motions is claimed to be a valued sign, cases are common where excessive movements are followed by the delivery of living children. Unless a record of the fetal motions has been kept for some time, and careful observations taken during labor, which is seldom done, this sign of threatened asphyxia is of little value, if not corroborated by other evidence. No one would use the forceps or perform a version because of excessive fetal motions alone. Absence of heart tones is no proof of the child's death, unless corroborated by other evidence

As shown by v. Hueter, slowing of the fetal heart during pains is normal, and the normal rate is only found in the interval. To indicate danger, the heart should be slowed progressively between the pains. This slowing is due to brain pressure, or to irritation of the medulla through the excess of venous blood. Later the heart tones are increased in rapidity when paralysis of the heart occurs, as shown by Schultze, and an immediate delivery is necessary to save the child. If the heart rate falls below 100 beats per minute, or rises above 160, during the intervals between uterine contractions, the child is in danger of asphyxia. Irregularity of the heart tones, or weakening, and a more valvular effect of the first sound, should put the attendant on his guard.

The passage of meconium through the sphincter ani is due to the active peristalsis of the intestines forcing the meconium out of the body. Williams claims that the phenomenon is due to paralysis of the sphincter caused by the faulty æration of the blood, but asphyxia in the living child causes spasms and contractions of the muscles rather than paralysis, except late in the process, and if the sphincter is paralyzed at that time, there would in all probability be a paralysis of the intestines as well, and meconium would not be discharged as a result. Evidence of former attacks of partial asphyxia, as shown by greenish meconium thoroughly mixed with liquor amnii, is not incompatible with the birth of healthy and normal children. Only when fresh black meconium is forced out of the uterine cavity in head or shoulder presentations are we justified in extracting.

A very certain sign of asphyxia, though rarely elicited, are the movements made by the fetus in efforts at respiration. If the head presents, the examining finger may detect a motion similar to that which accompanies the act of swallowing. The head is quickly extended and flexed. The same motion is seen in a foot in breech presentations. If air has entered the uterine cavity, it may be inspired by the fetus, and the so-called vagitus uterinus, or intra-uterine, cry be heard. It may also be possible to pass the hand above the head and feel the fetal chest expanding in utero. Palpation of the cord gives us absolute information as to whether the fetus lives or not, and aids in determining what method of extraction is best suited to the case in hand. While we are in duty bound to follow that method of treatment that gives the child the best chance for its life, it is unwise to perform a serious and difficult operation in the hope of saving a deeply asphyxiated child, at the risk of injuring and lacerating the tissues of the mother. Watchful expectancy and careful diagnosis will early decide the treatment to be instituted, and operative procedures can be carried out, when both mother and child are in good condition. Forewarned of the probable complications of labor by a careful ante partum examination, frequent auscultation of the fetal heart sounds will enable the attendant to save many children that would otherwise be lost.

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FALLACIES OF INTRAABDOMINAL AND ATMOSPHERIC PRESSURE AS SUPPORTS OF THE UTERUS AND ABDOMINAL ORGANS[1]

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IN considering the question of intra-abdominal and atmospheric pressure, which has been the subject of numerous and varied opinions, I am compelled to ask the indulgence of at least two classes. First, those who will so readily agree with me that they will consider the arguments and proofs unnecessary, and, second, those who will disagree with with me to the extent that these same arguments will be unavailing. In the hope, however, that there is a middle class who may have been misled by the current literature, but who will accept the laws of physics as having relation to the contents of the abdomen as well as to other material things, I have thought desirable to present this paper.

In order that we may understand, to some extent, the prevalence of error which exists in medical literature, I will first present the following extracts from text-books and periodicals:

[HART AND BARBOUR, 6th ed., p. 373.

"We may thus suppose that intra-abdominal pressure (which, when the uterus is in its normal position, is directed upon its posterior surface) comes now to act upon its anterior surface and drives the fundus backward and downward." On pages 61, 75, and 385 this author speaks of intra-abdominal pressure as a downward force.

[1] Read before the Chicago Gynecological Society, January 17, 1908

MONTGOMERY, 2d ed., p. 423.

"The round ligaments are, of course, an insignificant force, but it must be remembered that the uterus weighs less than an ounce, and we can understand, therefore, how they serve to maintain the uterus far enough forward to permit the intra-abdominal pressure to be directed against its posterior surface. So long as the intra-abdominal pressure continues upon the posterior surface of the uterus it is held forward against the bladder."

HIRST, Disease of Women, 2d ed., p. 286.

"In the erect posture, the bladder affords the uterus considerable support in a moderately distended condition, and intra-abdominal pressure with the weight of the abdominal contents upon the posterior uterine wall is a most important factor in maintaining a normal position of the uterus." Page 288, Hirst further says: "If she (the patient) is allowed to strain too hard in defecation; to lift her baby, or make any physical effort in the early puerperium, that much increases *intra-abdominal pressure*. the uterus is likely to turn over backward."

GILLIAM, pp. 174, 175.

"The uterus being retroverted, the *intra-abdominal pressure* falls on the fundus and anterior surface of the same, forcing it downward." Again, p. 189, "The bulging forward of the posterior wall in rectocele drags the cervix forward and downward, and tilts the uterus backward until *intra-abdominal pressure* is exerted on its anterior surface." He again says, on pp. 188 and 189: "In the newly delivered woman the abdominal walls are flabby, thus, in great measure, abolishing the *retentive power* of the abdomen."

On p. 174: "Intra-Abdominal Pressure." "This is a factor for good or evil, according to the position of the uterus. Where the fundus is directed forward so that the intestines rest upon the posterior aspect of the uterus, the intra-abdominal pressure serves to maintain it in a state of anteversion, and to prevent retroversion. It also counteracts the ascent of the uterus, and by holding it forward out of line of the vaginal canal, prevents its descent. If, however, the uterus is in a state of retroversion, so that the intestines fall upon the fundus, and anterior aspect of the same, the intra-abdominal pressure serves to aggravate the condition by forcing it still farther backward and downward along the vaginal canal."

RETENTION OR SUCTION POWER OF THE ABDOMEN

"This is due," says Gilliam, "to the counteracting influence of the atmospheric pressure from the outside, which opposes descent of the pelvic organs through the natural pelvic outlet. A very familiar illustration of this physical fact is found in tapping a barrel which is filled with liquid. Daily experience teaches us that if only one opening is made in the barrel, the contents will not flow. This is because of the almospheric pressure from without. If now an air hole be made above the level of the fluid so as to admit air into the chamber, this counterbalances the atmospheric pressure at the opening or exit, and the contents escape by their own weight. If one end of a glass tube be placed in a vessel of water, and the other in the mouth, and the air is exhausted, the atmospheric pressure causes the water to rise in the tube and fill the mouth. The retentive power of the abdomen is a constant and important factor in preventing the prolapse of the pelvic and abdominal organs, though not so effective as it might be were the abdominal walls rigid and unyielding to ward off lateral pressure."

DUNCAN MATHEWS

Retentive power of the Abdomen.— Edinburgh, Med. Jour., 1865, Vol. XI, p. 516, speaks of retentive power as a mechanical quality. The uterus ascends during pregnancy as a result of the sucking of "the retentive power." He says, "Another illustration of the physiological use of this retentive power, is, I believe, to be found in the study of what is called the ascent of the pregnant uterus from the pelvic cavity into the abdominal cavity. As the uterus enlarges in early pregnancy (sometimes, also, as it enlarges in disease) the base of the thorax of the female is expanded, the capacity of the abdominal cavity is increased and the uterus, instead of forcing its way against the influence of gravitation, is probably drawn up, at least, to some extent into its new site. In some cases, as I shall hereafter mention, this drawing up is abnormal or extraordinary in force, and the uterus is then entirely sustained by the drawing up forces, being removed from solid subjacent support." He then proceeds to explain retention of the urine, the support of the liver and other abdominal organs as being due to the retentive power of the abdomen, and considers this as something apart from atmospheric pressure. He also uses this theory to explain the absence of hæmorrhages after delivery. He accounts for the ascent of the semen, the backflow of blood and pus, and the abnormal wanderings of the ovum in this way. "Hæmorrhoids and varicose veins,"he says, "are due to lack of retentive power."

PENROSE, Text-book of Diseases of Women, 5th ed., p. 99.

"Finally, this motion (downward motion) is restrained by what has been called the 'retentive power of the abdomen,' which is merely atmospheric pressure acting from below on the contents of a vessel, the top and sides of which are closed. If a glass tube be filled with water a finger placed over one end, and the tube inverted, the water will not run out; it is sustained by atmospheric pressure from below. In order that the column of water be sustained, the sides of the tube must be rigid and unyielding. If the sides of the tube yielded slightly to atmospheric pressure, they would sink in and a certain amount of water would escape."

"The abdominal and pelvic cavities in the erect woman may be considered as a tube, filled with fluid contents. The top of the tube is closed by the diaphragm; the sides are the more or less rigid abdominal walls and the back, the floor is the perineum.

When the floor is destroyed, a hole is made in the bottom of the tube; the contents tend to fall, but the fall is resisted by atmospheric pressure acting from below." Penrose then goes on to show that the retentive power due to atmospheric pressure is proportionate to the rigidity of the abdominal walls. "When a woman is erect, the uterus lies at a slightly lower level than when the woman is on her back, and the intra-abdominal pressure, acting upon the posterior surface of the fundus, turns the uterus more forward, so that the fundus lies nearer the symphysis pubis."

Sielski, of Lemberg, has written an article upon the mechanics of uterine support that is remarkable for its contradictions and erroneous statements. Space will not permit quotations in full, and I can make only brief mention of the most striking. He considers high fixation of the uterus a cause of increased cervical discharge through lessened pressure in the vagina. He also attributes sterility to this cause at times — the spermatozoa not being able to pass from the lesser pressure of the vagina to the greater pressure of the uterus and tube. He considers the uterus superimposed upon the bladder and held by adhesion and air pressure. Two peritoneal surfaces, he teaches, cannot leave each other, in a perpendicular direction, without great force; that they can only slide upon each other. He considers the liver held against the diaphragm by atmospheric pressure, laying no value upon the ligaments. One intestine loop cannot leave another or the abdominal wall, nor the uterus the bladder, because they are held by atmospheric pressure, and yet he considers that these organs are not held together by atmospheric pressure as soon as the abdomen is opened. Perhaps he overlooks the fact that the liver continues to move with the diaphragm, even when the abdomen is opened. Even these remarks do not convey a half of the absurd things that he expects the "sucking" and "atmospheric" pressure and "lessened resistance" to do. I do not wish to have it understood that these men are alone in believing what these quotations and abstracts show, nor do I hold that these are all of their misleading remarks. I wish to say, also, that in the writings of some of these authors were other things which showed them to have reasoned more logically. I have merely undertaken in the above to show that these beliefs pervade the literature, and require attention:

The erroneous teachings are:

1. That intra-abdominal pressure is downward only, pressing upon the posterior aspect of the uterus, drawing it forward when the uterus is forward of a vertical line, and upon the anterior aspect of the uterus, drawing the organ backward when it is posterior to a vertical line.

2. That the abdominal organs are buoyed up by some unknown force called the "retentive power of the abdomen."

3. That the abdominal organs are held by atmospheric pressure upon the abdominal walls, this being due to their pliability.

4. That the abdominal organs are held by atmospheric pressure from below, this being possible by reason of rigid abdominal walls.

5. That water will not flow from a tube if one end be covered. (Penrose.)

6. That liquids will not flow from a barrel with only one bung hole. (Gilliam.)

7. That the uterus travels upward during pregnancy because of "suction." (Duncan.)

8. That abdominal and pelvic organs are not held in position by ligaments.

9. That abdominal organs are held in contact and cannot be separated in a perpendicular direction without great force.

In order to make plain the error in the above beliefs, let us first consider with what structures we are dealing. The abdomen may be considered a large, closed cavity, filled entirely with contents, and a wall partially fixed, and partially contractile and elastic. The walls, as far as they are of use to the abdomen itself, may be considered protective, restrictive, supportive and expulsive. Their strength lies, under normal conditions, so as to be of greatest use for these purposes. The upper wall is thin, because it does not have to resist gravity of organs. The pelvic floor is strong, because of this extra work. That Nature has provided for this is seen in the much stronger pelvic floor in upright animals, while quadrupeds have a much stronger fascia lata over the abdomen.

The contents of the abdomen are semi-solid structures, and hollow viscera containing gases, liquids, and semi-solid materials. The viscera are partially, or almost completely, covered with peritoneum, and this, instead of

enclosing each organ separately, is continuous, making a closed sack, containing a small or large amount of fluid. From the standpoint of support, the peritoneum is interesting, not in that it is a closed sack, but in that it runs from each viscera to a more fixed structure, and in this fold encloses connective tissue, and, in some instances, muscular tissue, which, together with the peritoneum, makes a suspensory ligament. This is, also, a neuro-vascular pedicle. The fluid in the peritoneal cavity, the hollow viscera with well lubricated coverings, which allow one to move easily upon the other, the gases and liquids in the viscera, give to the abdominal contents somewhat the nature of fluids, being governed by some of the laws which govern fluids. Physicists recognize, however, thin fluids, and viscid fluids. In the latter, the laws are not obeyed so promptly; but given time may, if not too viscid, act just as surely. By many, the abdominal contents are likened to a fluid, but, because of the semi-solid nature of some of its structures, it must be considered of a viscid, liquid nature. In ascites the laws of fluids would be more promptly obeyed. With impaction of feces the sigmoid may act only in the line of gravity. For practical purposes, then, we may consider the abdomen as a large, contractile sack, filled with a viscid fluid, but failing to exert all the gravity of the fluids upon upon the sack because much of the weight is carried by the ligaments of the different viscera. Now, to analyze the forces which are found making pressure in an elastic sack, we have to consider the elasticity of the sack, the weight of the contents, and the kind of contents.

1. We have the pressure upon all structures by reason of the contents being too large for the sac, or the sac contracting upon its contents. This could be illustrated by overfilling a rubber sac with air. This exerts a force in every direction alike. This in the abdomen changes from moment to moment by contraction and relaxation of the abdominal walls, as in lifting, coughing, sneezing, breathing, etc. From hour to hour, by the formation of gases, food, and water ingested, and urine and feces excreted, from day to day; by relaxation of the abdominal muscles by ascites, growing organs, etc., this force upon gases or thin liquids, would be promptly equal in all directions, but upon viscid contents might be at first imperfectly distributed, but, if continuing to act, would eventually be equal in all directions. This, by some, is called intra-abdominal pressure. This force, acting alone, does not change the position of an organ unless a place of lesser resistance is found. This might make the abdominal contents project through an opening, or make an opening, but it does not work only upon the upper surface of an organ, as implied in the former quotations. This force, acting alone, would as easily cause a hernia through the upper wall of the abdomen as through the lower, if both walls were equal.

2. In a sac or pail we have a force exerted by reason of the weight of the contents. If the contents are liquid, at any height of column the pressure is equal in all directions at any given point, but increases from above downward, so that at the bottom of the pail or sac the pressure is greatest. This force, acting alone, tends to cause the sac to become pear-shaped; tends to find the weak places in the lower part of the abdomen, but not in the upper.

This force would not tend to drive an organ downward. In fact, if the organ lay against, but not attached to, the floor, with the sac empty, upon the introduction of fluid the organ would exert as much less gravity against the floor as the weight of water displaced by the organ. This, then, does not act upon the upper aspect of organs driving them downward. It tends rather to make intra-abdominal organs rise. This tends, then, to put organs at ease and transmit the force to the abdominal wall. If the abdominal wall, say the pelvic floor, is weak, and bulges, it will drag down with it any attached organs, such as the bladder, rectum, uterus, etc. This force acting in all directions at a given point, together with the first named force, is sometimes measured as intra-abdominal pressure.

This combined pressure varies as number one varies, and as the height of the column varies, and would be greater in the lower part of the abdomen. With no free fluid in the peritoneal cavity, and the ligaments in good condition, the difference between this pres-

sure in the upper and lower abdomen is very much lessened.

3. We have, by reason of the solid or semi-solid nature of the abdominal organs, straight downward pressure when they are in equilibrium. This force, acting alone, with structures in equilibrium, would exert force only on the bottom of a vessel and not upon the sides or top. This force, acting alone, causes any organ to drag down, by reason of its own weight, as far as its ligaments would allow it to. Solid structures coming down upon the uterus would act in a vertical line, and force it toward the pelvic floor. Each organ has its own suspensory apparatus to resist this downward movement, but, this failing, the force is transmitted to the structures below, and their ligaments failing, to the bottom of the receptacle.

We have, then, the abdominal organs pressing and being pressed in every direction, to a variable extent by reason of their being too large for the sac or by reason of the sac contracting upon them, and we have them pressing downward, according to the laws governing liquids, each structure being buoyed up by surrounding structures, the pressure becoming greater toward the pelvic floor, this force being transmitted at last to the lower wall, and lastly we have the direct downward pressure of solid structures. Much of the fluids are in the viscera, so we have not only the gravity of the solids, but the gravity of the liquids, resisted by the ligaments of these organs. Intra-abdominal pressure makes equal pressure on all sides of the uterus, as well as all other organs. The fluid pressure exerts an upward pressure upon the uterus, and all other organs, equal to the weight of the fluid displaced. Pressure of solid structures is directly downward when they are in a state of equilibrium. That force which carries the fundus forward when it is anterior to a vertical line, and backward when it is posterior to this line, is gravity. Any of these forces tend, with a weakened, bulging pelvic floor, to cause downward and backward displacement, whether the uterus is anterior to the vertical line or not, for the reason that the bulging perineum makes traction upon the cervix through the medium of the vagina.

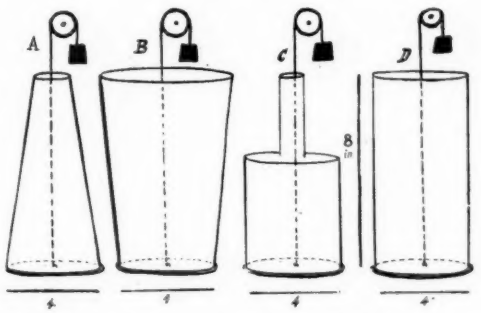

Fig. 1. A. B, C and D. Each same height and same size loose bottom, each requiring same weight to keep bottom in place when filled with water.

The body is adjusted to atmospheric pressure, which is alike on all parts of the abdomen, and no account has to be taken of it when considering the forces which support the abdominal contents. Measurement of pressure in the abdomen indicates merely the pressure above or below atmospheric pressure. Atmospheric pressure can no more be counted upon to maintain abdominal organs, than it can to support the contents of a stove, or to sustain a house. Atmospheric pressure would only press the abdominal wall inward when the pressure within is less than without at the point where it presses, and in that case no support is needed. The abdominal and chest muscles manipulate air for breathing purposes, but air does not manipulate these muscles or the abdominal organs. These statements may be considered opinions, and not proofs. They certainly differ from those held by Penrose, Gilliam, Sielski, Duncan, and others. Some observations, experiments, and illustrations may be used to demonstrate the error of these authors.

Observation number one contradicts Gilliam's statement that liquid will not flow from a barrel with a hole in the lower end only. This observation was made when quite a small boy. A younger brother turned the faucet in a molasses barrel and the contents were found upon the cellar floor. If there is one thing upon which temperance people and topers agree, it is that every whiskey barrel should have an opening in the lower end; but their purposes would differ.

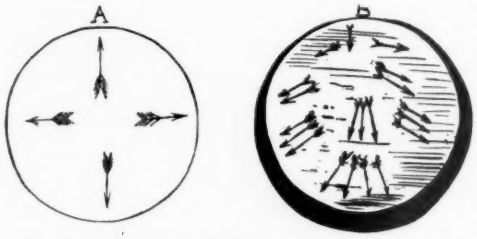

Fig. 2. A. Diagram illustrating pressure in all directions when a sac is filled with air. B. Diagram illustrating increasing pressure upon the vessel walls when filled with water.

Observation number two is, that a jug and bottle lose their contents if inverted. These things seem too simple to record, and yet we are dealing with quotations to the effect that atmospheric pressure will prevent fluid from escaping.

Experiment number one contradicts Penrose's statement that if a tube is filled with water and a finger held over the upper end, the water will not run out. A one-half inch tube was selected, filled with water, the upper end covered with the finger, the lower finger was removed, and the water promptly escaped. Observation number three has noted this many times in a test tube, but a positive statement is made by Penrose. One would say that he refers to a tube so small that capillary attraction would prevent air entering, but in that case, he must not liken the abdomen to a capillary tube. Even though these statements were true, they would still be useless as illustrations, because they, with rigid walls, have no parallel in the abdomen with its elastic walls.

Experiment number two contradicts Sielski's statements that an intestine cannot leave the abdominal wall; that the uterus cannot leave the bladder; that one organ cannot leave another, without great force. A rubber glove has its fingers tied, with air and water in them; the glove is then turned over the fingers, filled with other glove fingers, containing air and water, and the glove containing some water is tied at the wrist. This gives us a sac like the peritoneal sac, with rubber surfaces instead of peritoneum in contact. This is not so well lubricated as the peritoneum, and, therefore, its surfaces adhere more, but the walls are easily made to leave any portion of the contents. One portion of the contents leaves another portion with the greatest ease.

Experiment number three proves the same. The intestines of a rabbit are placed in a rubber, air-tight sac, and it is found that they can be made to leave each other and the abdominal wall in a perpendicular direction.

Experiment number four indicates the same on a rabbit. The abdominal walls were cut away down to the peritoneum, and it was found that the peritoneum could be picked up without the bowel or omentum, the two walls easily falling together. By manipulation, one bowel could be moved from the other without force.

I could find no reliable experiment to disprove Duncan's statement that the uterus ascends during pregnancy, because the abdomen first enlarges, leaving a negative pressure in the upper part of the abdomen which sucks the uterus up; but my judgment is strongly against this. My opinion is that the growing uterus is the cause of abdominal enlargement, and that intra-abdominal pressure is increased during pregnancy. Neither can I subscribe to his belief that the retentive power of the abdomen is the power by which the semen ascends, and hæmorrhages are prevented, but rather am I inclined to believe that a lax abdominal wall, with negative pressure, would favor a tardy contraction of the uterus, and so favor hæmorrhage.

Some experiments show what should, according to the laws of physics, occur with a

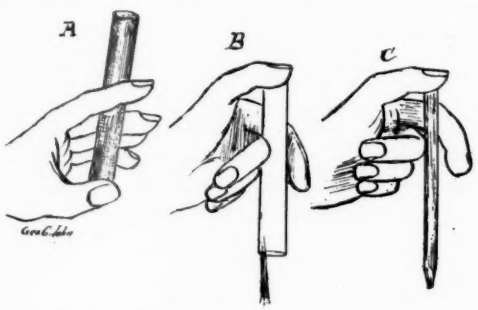

Fig. 3. A tube filled with water. B. Same inverted; water running out. C. Capillary tube in which water is retained as long as upper end is covered so as not to admit air.

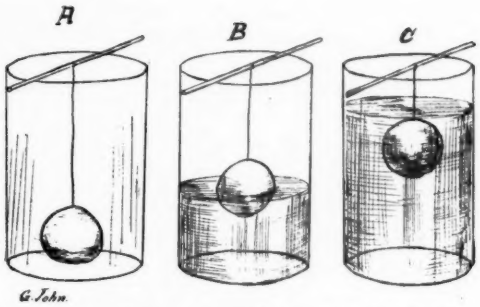

Fig. 4. A. Empty jar containing a body heavier than water, and fastened to a crossbar by means of a rubber. B. Same partly filled with water. C. Same filled with water until rubber and water no longer carries the body above the surface.

structure like the uterus, suspended in the lower part of a receptacle. In this connection, let us remember that the uterus, while a pelvic organ, is an abdomino-pelvic organ; that it is above the pelvic floor, and not a part of the pelvic floor. It is attached to the pelvic floor by means of the vagina, but this is not intended to act as a ligament to hold the pelvic floor up, nor the uterus down, and, being below the uterus, and not a column, it cannot be intended for uterine support. With lax uterine ligaments, the uterus may come to lie against the pelvic floor. This is true of the kidney, sigmoid, stomach, or liver.

Experiment number five: A body heavier than water is suspended by means of an elastic ligament so that it just touches the bottom of a glass jar. Water is now added, when the body begins to rise, and continues to do so, until the combined buoyancy of the water and lift of the now contracted ligament are not sufficient to raise it further. This indicates that the uterus, which is suspended by its ligament at a certain height in an empty abdomen, would be carried a little higher if the abdomen contained contents of the nature of fluid.

Experiment number six: A body is suspended in a glass jar and attached to an elastic bottom. Water is added, with the jar still resting upon a solid base so that the water cannot depress the bottom, and the body rises, but less than it would without the attachment to the bottom. The jar is now lifted from its support, allowing the weight of the water to depress the elastic bottom when the elastic attachment causes the suspended body to become depressed. If this is at one end, the long axis of the body approaches more nearly the vertical line. This means that if the pelvic floor is weak, and sags, it drags by means of the vagina upon the uterus, and being attached to the posterior end of the uterus, throws it into a more nearly vertical position, and stretches the sacrouterine ligament. This would not occur with a strong pelvic floor.

Again, we may suppose the uterus suspended the same way, while solids are placed in the jar; the uterus is now carried down by two forces — the sagging pelvic floor pulling upon it, and the solid structures making pressure from above.

Mayer scouts the idea of "negative pressure," even in the knee-chest position, and speaks of intra-abdominal pressure as a "chimerical phantom." His arguments lack logic and proofs, which are characteristic of Hörmann's article.

Experiment number seven: This disproves Mayer's statement and explains the phenomenon observed in the knee-chest position. A glass jar, open at both ends, is covered at one end with a thin rubber dam. The jar is now filled with water, which causes the rubber dam to sink down markedly. While this sinking is prevented to its fullest extent, two thicknesses of rubber dam are tied over the upper end. The water is now allowed to bulge the single

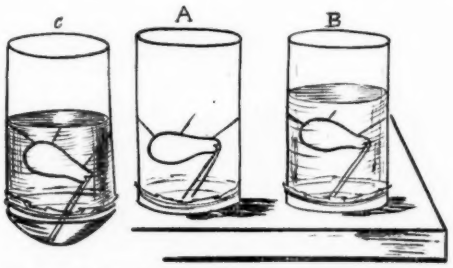

Fig. 5. Diagram illustrating uterus suspended in vessel with elastic ligaments and attached to an elastic bottom. A. Vessel is empty and sitting on a solid base preventing bottom from being depressed. B. Same filled with water causing the uterus to ascend, but being attached at vaginal end this is held somewhat. C. Same vessel removed from solid base. The weight of the water depresses the bottom and drags the uterus with it. This illustrates the effect upon the uterus of a weak pelvic floor. (See text.)

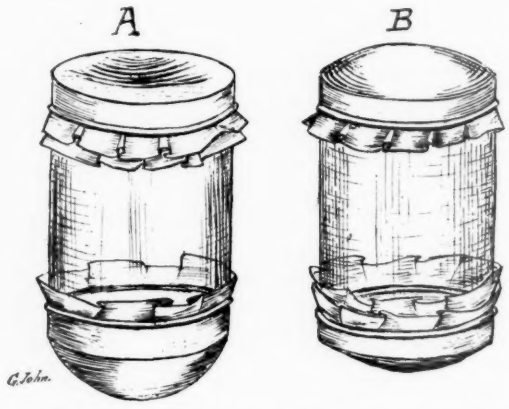

Fig. 6. Represents a jar with rubbers over each end, one end having one layer, the other two layers making it stronger. A. Represents the weak end downward with much bulging thereby causing negative pressure above. B. shows the two layers at the bottom with less bulging or positive pressure above. (See text).

layer, which causes the double layer to be drawn into the jar. The jar is now inverted, and both ends bulge. In other words, if the two layers furnish the floor, the water is not allowed to sink so but that the roof bulges. If now the jar be again inverted, and the two layers are above, they will be drawn in as before. If now an opening be made through these two layers, air will rush in, and the double rubber will return to position. If an opening had been made in the single rubber while above, water would have flowed outward. The two rubbers here represent the pelvic floor and solid pelvic walls, while the single rubber represents the more elastic diaphragm and upper abdominal walls. With the patient upright, we may have positive pressure in both parts of the abdomen, but with the patient in the knee-chest position, the abdominal contents find space in the more roomy diaphragmatic region, and the pelvis is left with a negative pressure and air rushes in upon opening the anus, vulva, or urethra.

Numerous efforts have been made to measure the pressure in the abdomen, but very variable results have been obtained. L. Bert and Hogge made measurements in the rectum. Kronecker, Meltzer, Rosenthal, tried measurements in the stomach, while Schatz calls attention to error in estimating intra-abdominal pressure from measurements made in the bladder. Luciani introduced a small rubber bag into the abdomen and connected it with a manometer; Hörmann criticises the work of these men, in that they considered abdominal pressure uniform, as they took it in only one place and gave measurements for the whole abdomen. They also made the mistake of considering intra-abdominal and intra-visceral pressure identical. Schatz lays stress upon the existence of uniform pressure throughout the abdomen, and considers it independent of gravity or muscle pressure. Dubois distinguishes between intra-abdominal and intra-intestinal pressure. Weisker, in measuring pressure in his own stomach, found the pressure to vary with changes in position. Moritz, after having himself tied to a ladder, found stomach pressure 7-8 cm. while in the dorsal position. Then, standing on the head, the column rose slowly to 20 cm., but returned to 6.5 cm. when he was let down to the dorsal position; in right side

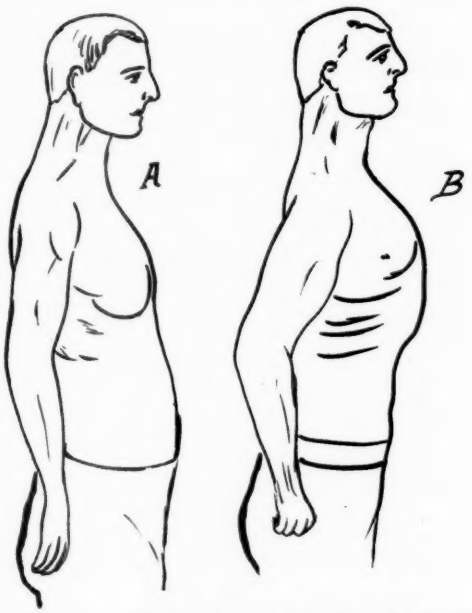

Fig. 7. A. Abdominal muscles relaxed with diaphragm low. B. Abdominal muscles contracted forcing diaphragm up. Abdominal walls not forced in by atmospheric pressure by muscular effort.

position 10 cm., in left side position, 42 cm. Qurin made measurements upon animals under complete anæsthesia, and found, with the animal on the back, 10 mm. (mercury) during inspiration and 5 mm. during expiration. Hanging tied to a board with belly down, he found during inspiration 60 mm., during expiration, 52 mm.

Hörmann found in living man negative pressure in rectum in knee-elbow position 14 and in dorsogluteal position 17 cm. He found negative pressure of 9 cm. in bladder with patient in the Trendelenburg position.

In dogs under deep anæsthesia, or recently killed by chloroform, he found negative pressure in the peritoneal sac in epigastrium in vertical suspension on the shoulders, 7.5cm. Negative pressure in epigastrium in vertical suspension on hind legs, 9 cm. Negative pressure in peritoneal sac close to the spinal column, abdomen hanging free or in lateral position, 2 cm.

In conclusion, I would say:

1. The abdominal contents in an elastic sac are composed of liquid, gaseous, semi-liquid, semi-solid, and solid material of variable quantities.

2. By reason of their being too great for the sac at times, and by reason of muscular action, we have an intra-abdominal pressure which, with equilibrium, would be equal in all directions.

3. By reason of the constant disturbance of equilibrium, and by reason of the sluggishness of the abdominal contents to respond to fluid pressure, this pressure varies in different localities at a given time.

4. This pressure varies in different individuals, and in the same individual, from moment to moment, with sudden muscular contractions; from hour to hour, with ingestion of food and water, and with excretions; from day to day, with changes in abdominal contents.

5. This pressure does not tend to drive organs downward by acting upon their upper surface, but merely finds the places of least resistance in the walls, and endeavors to force contents through these areas.

6. The abdominal contents all have gravity and are sustained by the walls of the sac, the same as the contents of any other sac, except that each of the viscera is suspended by its ligaments.

7. Each organ is primarily suspended by its attachments, but by reason of the semi-fluid nature of the contents, each organ is partially floated by the others and the weight transmitted partially to the abdominal floor.

8. Any organ floating in fluid presses downward as much less upon its supports as the weight of the fluid displaced by the organ (Archimedes' Principle).

9. The pressure of fluid contents is equal in all directions at a given point, but this pressure is finally transmitted to the walls of the sac perpendicular to its surface, and in proportion to the height of the column above the given surface.

10. By reason of these principles, the abdominal contents do not press the uterus down, when they act in the nature of fluids, but rather they buoy it up.

11. Intra-abdominal pressure, which is equal in all directions, and fluid pressure, which buoys the uterus up, indirectly cause the prolapse of the uterus by not finding the proper resistance at the pelvic floor.

12. The pressure of solids is directly downward when in a state of equilibrium, and it is possible to have abdominal contents of a solid nature come down upon the uterus in such a way as to hold it forward when it is anterior to a vertical line, and backward when it is posterior to a vertical line.

13. The gravity of the body of the uterus itself tends to hold it forward when it is anterior, and backward when it is posterior to a vertical line.

14. Intra-abdominal pressure does not have the above effect, but tends, when excessive, by its action on the pelvic floor, to cause displacement, whether the uterus is forward or not.

15. Atmospheric pressure has no part in the support of abdominal organs, more than it has in the support of grain in an air tight sac.

16. Atmospheric pressure acts merely in an effort to make the sac fit the contour of the abdominal contents, which they, by their gravity, and resistance of some portion of the sac, take.

17. Atmospheric pressure presses the wall in where the contents are making no pressure, therefore, where support is not needed, and never where they are making positive pressure, where support is needed.

18. In other words, when lax ligaments allow abdominal organs to make undue strain upon the pelvic floor, bulging the lower part of the abdomen, the air would be pressing inward at the epigastrium and diaphragm.

19. The abdominal organs are not held together surface to surface, so that it is difficult for one to leave another. One moves as easily away from the other, and something else moves in to take its place, as though they were in a sac of mosquito netting.

20. The uterus is an abdominopelvic organ, and not a part of the pelvic floor.

21. It lies normally above the pelvic floor and not against it, but is attached to it by means of the vagina.

22. If the vagina is to be considered a ligament, it must be for support of the pelvic floor or to prevent ascent of the uterus.

23. The uterus may come to lie upon the pelvic floor, but so may the other abdominal organs.

24. The pelvic floor is, then, only indirectly a support to the uterus, as it is to other abdominal organs.

25. With a weak pelvic floor, we may have hernia of abdominal organs; first the bladder and rectum, then the uterus, and then other organs.

26. The uterus is primarily supported by its ligaments, but may be partially carried by fluid pressure or may be pushed downward by solid structures.

27. With a weak pelvic floor the bladder, rectum, uterus, and ligaments may be called upon to do this work of the pelvic floor, and may succeed for a time, but are apt to rebel sooner or later, and prolapse, especially with excessive intra-abdominal pressure.

28. The pelvic floor is a very important structure in abdominal support.

29. Injuries to this structure are often responsible for displacements of the uterus.

30. When displacements have occurred, however, orthopedic work upon the ligaments is usually as necessary as repair of the pelvic floor for permanent relief; neither alone is sufficient.

31. The uterine ligaments, being the normal support of the uterus, should receive our attention when surgical work is necessary, rather than the creation of false ligaments.

32. In increased intra-abdominal pressure, much may be accomplished by remembering that the contents of the abdomen are too great. Diet, exercise, massage, positions, will accomplish much.

III. THE PERIOD OF AWAKENING OF MILITARY SURGERY

By NICHOLAS SENN, M. D.

AS the day is separated from night, by dawn and twilight, so one period of the history of military surgery gradually, almost imperceptibly, shades into another; there are no well-defined landmarks set between them. Some of the lights, kindled during the mediæval age, have become permanent fixtures in the modern medical sky, and will remain there as long as the art of surgery will be practiced. The ligature, introduced by Paré into general practice, rude and defective when first employed, has reached a degree of perfection in modern times which leaves but little if anything to be desired. The teachings of Paré, on the method of exploring bullet wounds with the probe, have never been improved upon, and must be borne in mind at the present time, in the exceptional instances in which a recourse to this diagnostic expedient is deemed necessary. The importance of establishing and maintaining free drainage in the treatment of suppurating wounds, as emphasized by a number of the old masters, has only increased with the advancement of surgery. We will now discuss an ill-defined period in the history of military surgery that marks the gradual transition of the mediæval age into what deserves to be called modern military surgery, and for reasons which will be advanced in this lecture may

well be called the period of awakening. It is a period during which the representative military surgeons cast off the yoke of authority and sought new light by accurate clinical observation, original thought, and to some extent by original research. It is a period which foreshadowed the dawn of modern military surgery. It was during this period, dating back to the latter part of the eighteenth century, that human genius was busily engaged in improving and perfecting the old, clumsy firearms, and we will first discuss the

IMPROVEMENTS OF THE OLD FIREARMS

Up to the beginning of the nineteenth century, all military firearms were smooth-bores, and fired round large balls. The greatest improvement made, up to that time, was the substitution of the percussion cap for the flint-lock, about the year 1820. The metallic ramrod was introduced in Prussia by Fürst von Anhalt, in 1718, an improvement which made loading more expeditious. Hand-grenades were used for a long time. As they had to be lighted with a fuse and had to be thrown by hand, they could be employed only at short range. The short range of the small firearms of that time made it necessary to approach the enemy to within two hundred yards or less, to render the fire effective, and hence, hand-to-hand encounters and cavalry charges often constituted the decisive point of battle. During the middle of the seventeenth century, bombs fired from mortars, and which were exploded by a percussion cap when they hit their mark, took the place of the hand-grenades. The old cannons are noted for their prodigious size, and it always has been a mystery to me how Napoleon I. ever succeeded in hauling the monster cannons to Moscow which, after his defeat, have been sleeping within the walls of the Kremlin. Gradually the muskets and cannons were made smaller as their calibers were reduced. While the rifling principle had been known and used for many years, it was not introduced for military service until the beginning of the nineteenth century; to these rifles was then applied the percussion cap. The breech-loading principle was also made a partial success for military arms at the same time. In Prussia, the army was supplied with the needle-gun in 1841. This invention was eagerly adopted, and in a few years different breech-loaders replaced, in every country, the muzzle-loading rifle. The introduction of the jacketed bullet, which combined the cap, powder, and bullet in one case, marked another important step in the evolution of the military firearms. In the United States the first effective breech-loader was invented by Hall in 1811. In 1854, Congress made an appropriation for breech-loading rifles, and a board of officers recommended those of Sharps and Symmes for trial. Three years later, the Burnside rifle found more favor, but was not recommended for adoption. During the Civil War, the best known breech-loaders were those of Burnside, Sharps, Maynard, and Henry. After the war, the Peabody, Remington, Sharps, and Springfield were received with greatest favor, more especially the Springfield rifle. With the gradual improvements of the small firearms, new inventions of increased destructive power, fired from large arms, were introduced in warfare and inflicted horrible wounds, for the successful treatment of which the military surgeons were not prepared. Of these the shell is the most familiar to the soldier. It is a hollow projectile, containing an exploding charge which at some point of its flight is fired by means of a fuse. Case-shot is used in warfare on account of the greater number of fragments resulting from the separation of its cluster. Case-shot comprise grape-shot, canister, and shrapnel. Canister and grape-shot break up at the muzzle of the gun. Shrapnel, by means of a fuse, are made to burst at any desired distance. From the character of the firearms and projectiles in use during the period of the history of military surgery under discussion, we shall follow the evolution of the treatment of wounds inflicted by large round bullets of slow velocity and low penetrating power.

NEW IDEAS ON THE TREATMENT OF GUNSHOT WOUNDS

A study of the literature on military surgery, from the middle of the eighteenth century to the beginning of the dawn of modern surgery, will convince the reader that, during that time, reason gradually took the place of blind

superstition, and independent thought and a growing spirit of research gradually liberated surgical practice from the slavery and dogmatism of ancient authorities. The mysterious drawing salves and plasters lost their reputation and were replaced by remedies which possessed antiseptic properties, such as turpentine, camphor, and the different kinds of spirits. Turpentine was also extensively used as a styptic. Mr. Young, quoted by Atkins,[1] speaks of the styptic action of this remedy, as follows: "That it restrains a hemorrhage by contracting the orifice and begetting a firm coagulation of the blood; which coagulum, he thinks probable, heals the orifice of the bleeding vessel, either by uniting its coat, per symphisin, or by concarnation, i.e., begetting some intermediate substance, which it will nimbly do." The styptic action of oil of turpentine was recognized by the late Professor Billroth, who recommended it in cases of troublesome hemorrhage after excision of the tonsil. The treatment of hemorrhage, even during this time, was by no means uniform. Wiseman, who is called by Atkins the "Oracle of English Surgery," preferred the cautery to the ligature, claiming that it secures the bleeding arteries in a moment, fortifies the part against future putrefactions, and the stump, after amputation, requires the bandage less strict.

Atkins himself indorses this opinion, on the whole, believing that the cautery is a protection against mortification, but in case of hemorrhage from large arteries, he advises the surgeons to make use of the ligature. The experienced military surgeon, Theden, never ligated, but used the tampon and compression dressings.

Bilgür, who amputated only in exceptional cases, usually for gangrene, tied the vessels in the healthy tissues above the point of amputation. Water dressings took the place of salves, plasters, and infusions, on the recommendation of the surgeons of Frederick the Great, Bilgür, Schmuker, Theden, and Mursinna. Before this, wounds were filled with charpie, moistened with wine or brandy. If wounds became foul, the red wash (sublimate and lime-water), balsam of Peru, tincture of myrrh, alcohol or turpentine were used. Charpie, made of old linen, for a long time held its place in surgery, as a covering for wounds; and it would be impossible to compute the disasters caused by this material as a source of infection.

During the wars for more than a century, charitable women busied themselves preparing charpie for the armies, unconscious of the harm they were doing in sending infected material to the battle-fields and hospitals for the dressing of wounds. Even as late as the Civil War, tons of charpie were sent to the front by our patriotic women. Tow and jute, formerly in use, were much safer materials, but for a long time, especially in Germany, were displaced entirely by the infected charpie. That suppuration is not necessary as a preliminary step in the healing of wounds was first taught by Bentekoe, Overcamp, and Muralt. The older surgeons were not afraid to search for bullets with probe and finger, often enlarging the wound of entrance to widen the canal, and making counter-openings. The blind bullet tracks were always surrounded by a zone of contused lacerated tissue, which led surgeons, during the last century, to resort to primary *débridement*, a procedure which greatly increased the danger of infection. The probe was in constant use, and only too often the finger was also employed in searching for the bullet, or in attempts at extraction. It is safe to state that more wounds were infected by the surgeon's efforts to find and remove the bullet than by the injury they were called upon to treat. Pirogoff was the first one to raise his voice against digital exploration of gunshot wounds; and Stromeyer wanted to exclude the probe from the instrumentarium of the young military surgeons. The ancient military surgeons feared the entrance of air into wounds, and this fear was showed by Lord Lister during his epoch-making researches on the prevention of wound infection Experience, and later bacteriologic investigations, have shown, however, that wound infection is due largely to contact with the wound of substances charged with the essential microbic cause of infection. We can now understand why gunshot wounds, under the old methods of treatment, do constantly become infected. Dirty fingers and probes and infected dressing ma-

[1] The Navy Surgeon; or, A Practical System of Surgery, etc., by by John Atkins, Surgeon, 1734.

terials were responsible for the disastrous complications much more frequently than the bullet which inflicted the wound. Surgeons of that time hesitated in resorting to amputation, except in cases in which the limb was extensively crushed by large missiles and in cases of gangrene. Purmann, in amputating for gangrene, drew the skin upward, applied a firm circular bandage above the proposed line of amputation, and then, with one circular cut, divided all the soft tissues down to the bone, which was then divided with a saw. The skin was sutured over the wound, which was covered with the bladder of one of the large domestic animals, and over this a dressing, steeped in wine and rose oil. He always selected the morning hour for operation. His amputating outfit consisted of a saw, long curved knives, cautery iron, and astringent powder.

Atkins,[1] writing in 1734, on the indications for and technique of amputation, states under what conditions amputation should be performed. "When a limb is so shattered by a shot or splinter as to be entirely past a possibility of reduction; or when a wound (though not large) happens in a great joint, such as the knee or elbow; whence acute pains and convulsions are excited or probably would be, endangering life; and if healed, be not only useless but troublesome; or lastly, when any preceding hurt or distemper has induced a sphacelation,— there are other cases that may indicate amputation; but in these there is little room for suspense."

The following were his directions for preparations for amputation (page 119): "Your apparatus should be laid in three dishes: the first should hold your instruments — knife, cotton, saw, arterial forceps, and needles; the second, a lint pledget or two, half a score of others made of tow and different sizes, and with them a large round one, called a cap, spread with some astringent mass to cover the rest; and in the third, your powders and cross cloth." He used a tourniquet to control hemorrhage during the operation, tied the bleeding arteries, but did not suture the wound. All the soft tissues were divided by a circular cut on the same level down to the bone.

[1] Op. cit., page 118.

WRITERS OF THE RENAISSANCE OF MILITARY SURGERY

Under this heading, I will give brief sketches of the treatment of gunshot wounds, as laid down in a few of the most notable works on surgery and military surgery, written during the period of transition from ancient to modern methods.

Lorenz Heister[2] was unquestionably the ablest surgeon of his time. His book, in many editions, remained a recognized authority for a century. The first edition appears like a modern text-book when compared with those written only a short time before. He discusses the nature and treatment of gunshot wounds with an erudition that surpasses anything written before on this subject. He attributes the rarity of severe hemorrhage to the character of the wound, the bullet producing an eschar. During the period of separation of the eschar, secondary hemorrhage is liable to occur. This eschar is not the result of cauterization by the bullet, but the consequence of contusion of the soft tissues. He discredits the idea, so long entertained, that gunshot wounds are poisoned wounds, because neither the powder nor lead contain any poisonous substances. The grave complications are caused by the contusions inflicted by the bullet. Tangent shots of the skull may produce serious intracranial injuries by commotion and tearing of the vessels without fracture. Many of such cases prove fatal if trephining is not performed for the removal of the extravasated blood. All internal injuries inflicted by a bullet are more serious than if caused by other implements, because the contusions are more extensive; but even these are amenable to successful treatment if the large blood-vessels escape injury. Penetrating wounds of joints are especially dangerous. All foreign substances must be removed, or else the wound cannot heal. The treatment of gunshot wounds consists in removing all foreign substances, arresting hemorrhage, elimination of contused lacerated tissues by promoting suppuration, after which healing by granulation and cicatrization will take place under appropriate treatment.

If the bullet can be seen, it must be removed with forceps or hooks. If it is not in sight, it

[2] Chirurgie, etc., etc., Nürnberg, 1747.

must be searched for with probe and removed before swelling sets in, as at this time patients are more submissive to treatment and suffer less than later. Attention is called to migration of bullets lodged in the body, and the greater difficulty in finding them under such circumstances. In grasping a bullet with forceps, carefully avoid seizing important structures, such as blood-vessels, ligaments, and nerves; consequently the blades of the forceps should not be opened until the instrument is in contact with the bullet. If the wound of entrance must be enlarged, incision should be made in the direction of the muscular fibers, and at a safe distance from important structures. Place patient in position he occupied the moment the injury was received, in order that the probe can follow the track made by the bullet. If the bullet is nearer the surface on the opposite side of the wound of entrance, make an incision over it and extract it. If the immediate risk of an operation is too great, it is advisable to postpone it until suppuration has set in, when the bullet can usually be found and removed with less difficulty. If the bullet is lodged in one of the large cavities of the body, no attempts should be made to remove it, but efforts must be made to heal the wound, as bullets are well tolerated in such localities, and may remain indefinitely without causing any serious results. If a bullet has become impacted in a bone and cannot be removed in any other way, it must be withdrawn with the *tire fond*. If it is deeply located, the extraction must be made through a tube passed down to the bullet. If a bullet has penetrated a joint, it should be removed as soon as possible, as its presence in such a location provokes grave complications. In gunshot fractures, with extensive splintering of the long bones, it is advisable to amputate at once. If amputation is not indicated, the wound must be enlarged and the fragments removed. If a large artery has been severed, make digital compression over a compress applied over the bleeding point, apply tourniquet, and seek for the bleeding vessel and pass an armed needle under and around it, and tie. After foreign bodies have been removed and hemorrhage arrested, pour warm whiskey into the wound, or, what is still better, camphorated spirits of wine, or warm wine mixed with a little whiskey or lime-water, with camphorated spirits of wine. Over the wound is applied a compress, saturated with one of these preparations, and which must be retained in its place with a bandage. Suppuration must next be induced, and this is accomplished by applying an ointment made of the yolk of egg and turpentine. If a foul, profuse discharge ensues, add to the digestive salve, myrrh and aloes or theriac. If the bullet has passed through a limb, pass, with a long-eyed probe, a strip of linen through the entire length of the tract. Grease the linen strip with digestive salve at first and at each subsequent dressing, and leave it in place until the wound is clean.

The wound water, *eau d'arguebussade*, or a wound balsam promotes the healing process. The Egyptian ointment is recommended alone or mixed with alcohol, when the wound is sluggish in healing. If local mortification takes place, incise the dead parts, to remove the foul secretions, and use the eating water (Fresswasser), *aqua phagedenica*, composed of lime-water and sublimate of mercury. He does not mention bleeding, cupping, or the use of any depressing internal remedies; on the contrary, advises stimulants and nutritive diet to support the strength of the patient. These few extracts suffice to show the sagacity and good judgment of Heister, in the treatment of gunshot wounds nearly two hundred years ago; and, as we shall see farther on, his teachings dominated surgical thought for more than a century. His utterances sound like voices in the wilderness, announcing the dawn of a new era in the history of military surgery. Dionis, a French military surgeon of note, writing in 1777,[1] taught surgeons the art of extracting arrows and darts, as he said armies who had discarded the use of bow and crossbow might have to fight barbarians, and in such an event surgeons should know how to deal with such wounds. He advised to change the figure of the bullet wound from round to longitudinal, by two cuts with the bistoury in opposite directions from the wound of entrance, in order to convert it, as nearly as possible, into the shape and nature of an incised wound.

[1] Cours d'Operations de Chirurgie, etc., Huitieme Édition, 1777, First Ed., 1740.

After establishing drainage, he closed the wound in part by suturing. As a wound application, he recommended the *eau d'arquebussade*, lint compress, then plaster compress, moistened with brandy or aromatic wine. He emphasized the necessity of removing the bullet, as otherwise the wound could not heal.

"Car tant que la plaie, il n'est pas dans son pouvoir de la Guérir, parce qu'il est un obstacle à la réunion, qui est la fin qu'on se propose dans la guérison de toutes les plaies." He says this statement must not be taken literally, as in very exceptional cases the reverse is true. For us Americans, the text-book on military surgery, used by our surgeons during the war with England, is of special interest. It was written by the surgeon-general to the British army, John Ranby, Esq. The book is a small one, and contains, besides, a chapter on diseases incident to armies, by Baron von Swieten, translated from the original; and about one third of it is written by an American, John Jones, Professor of Surgery in King's College, New York, the title of which is "Plain Concise Practical Remarks on the Treatment of Wounds and Fractures, to which is added an appendix on Camp and Military Hospitals." The book was published in Philadelphia, in 1776, and was intended for our military and naval surgeons. Mr. Ranby, the British surgeon-general, had learned the ill effects of the too frequent use of the probe in searching for bullets. He says: "In order to get at the ball, or any other foreign matter that infests the wound, I would advise probing or poking to be used as sparingly as possible; having constantly experience, through the whole course of my attendance in these cases, that such a method is highly detrimental to the patient; and, indeed, where probing is necessary, I would always prefer the fingers as the best and truest probe." He speaks of the frequency with which bullets lodged in the tissues remain without causing any serious difficulty until, after many years, they have worked themselves a passage towards the surface, and were consequently easily extracted. He calls attention to the gravity of wounds implicating large joints. Early venesection is recommended as a prophylactic against inflammation. "Let the first dressing be with lint, dry, or moistened with a little oil, and a very light bandage; the next with a digestive warmed, and over it the bread-and-milk poultice, mixed with a sufficient quantity of oil to keep it moist; and where there is a great tension, and the wound large, a fomentation. This course is to be continued till the sore is clean, and then it is to be healed according to art." In grave gunshot injuries, he advised early amputation. Opium, bark, and aromatic sulphuric acid were his favorite medicines in the treatment of the wounded. Professor Jones practically gives the same directions in the treatment of gunshot wounds as Mr. Ranby, and the same general treatment of the patient. Both of these authors speak of the frequency of secondary hemorrhage, and advised in cases in which such an accident is to be expected, Petit's tourniquet should be applied above the wound, to be tightened the moment hemorrhage occurred, to be followed by ligation of the bleeding artery. From the above notes, it becomes apparent that the English and American surgeons of that time were far behind the progressive ideas of Hilden, of half a century before. Either these surgeons were not familiar with the teachings of Hilden, or the art of surgery had retrograded during the intervening time.

We will now consider, very briefly, the work of the most famous surgeon of the period of awakening of military surgery, Baron Larrey. This leading light of surgery on the battle-field is best known in history as the most intimate friend, and one of the few trusted advisers of the greatest soldier the world has known — Napoleon Bonaparte. It is safe to affirm that Baron Larrey had a larger and more varied experience as a military surgeon than any one before or since. He was a military surgeon for more than half a century, and participated in twenty-four military expeditions in three continents. He was with Napoleon during the most eventful period of his military career. Of humble birth, and after many hard struggles in obtaining his medical education, he gained, by his genius and faithful attendance to his duties, the recognition and confidence of his commander. He was chief surgeon of the army of the Rhine in 1793; and, on more than one occasion carried wounded soldiers through a rain of bullets to the rear. In 1792 he in-

stituted the flying ambulances, drawn by one horse, and so arranged as to carry two wounded.

In Egypt, he employed pannier-bearing camels for the transportation of the wounded; and introduced plastic fixation dressings in the treatment of gunshot fractures. He and all his surgeons were mounted, in order to render prompt aid to the wounded. A case, holding the necessary instruments, was fastened to the saddle. He made several Chopart's amputations in Egypt, although he was not aware that Chopart had previously described the same operation in 1791. He made the tarso-metatarsal amputation of the foot, performing what is now known as the amputation of Lisfranc. Larrey was an advocate of primary amputation in all grave gunshot injuries of the extremities. He employed the circular method, making several cuts. He advised amputation in all cases of penetrating gunshot wounds of the large hinge-joints. He was likewise a warm advocate of trephining for intracranial hemorrhage. His treatment of gunshot wounds was noted for simplicity. He used warm salt solution for recent wounds, and Labaraque's solution for putrid, sloughing wounds. He placed great stress on rest as an important element in the treatment of wounds, and consequently was opposed to frequent changes of dressing and meddlesome surgery in general. Among the many improvements, made for the wounded on the field of battle, by Baron Larrey, not the least is the introduction of temporary field hospitals as a regular and constant feature of the medical corps, and the prompt dressing of the wounded, and their speedy transportation to a place of safety, or the near-by field hospitals. Larrey was not only a great surgeon, but took great interest in natural history and the sciences. His travel notes, during his many campaigns in distant lands, as recorded in his Memoirs, show a diversity of knowledge on various subjects, which shows the greatness of his genius and the profoundness of his learning. An eloquent tribute to the memory of this the greatest of all military surgeons was recently paid by Professor J. Chalmers Da Costa, before the Johns Hopkins Historical Club.[1]

The name of Baron Larrey stands out in bold relief, like a beacon-light, directing his contemporaries and successors forward and onward in the direction of true progress. By his impressive teachings and brilliant example, he showed his colleagues what a military surgeon should be, and laid the foundation upon which to build the enduring structure of modern military surgery. The life-work of Baron Larrey kindled a perpetual brilliant light, which announced the approach of the dawn of modern military surgery.

SURGICAL ASPECTS OF VARIX OF THE LOWER LIMBS

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Of late, many operations have been proposed for the cure or alleviation of varicose veins. These methods are much alike in principle, their object being the extirpation or interruption in continuity of the offending vein or veins; and while the technic has been much improved, it must be confessed that these procedures vary little from those adopted by Severinus and Fallopius. In recent years, little attention has been paid to the etiology and pathology of the disease, and personal talks with some surgeons of the widest experience in this line have but served to emphasize the fact that these subjects, which should be the basis of all operative interference, have, in the case of varicose veins, been sadly neglected. A glance through the literature, most of which is old, is not reassuring, for the reader is overwhelmed by a mass of conflicting statements which throw his

[1] Barron Larrey: A Sketch. Johns Hopkins Hospital Bulletin, vol. xvii, No. 184.

mind into a mental chaos. The apparent benignity of superficial varices has made their study neglected; and yet there are few affections which lead to more varied and sometimes more serious complications. Again, their position suggests a simple causation, and extirpation as the remedy.

Much of the confusion in the literature arises from a loose use of the term "varix," many of the writers making the term synonymous with simple dilatation. Sir Benjamin C. Brodie (1) was one of the first to make a clear distinction between tortuosity from obstruction and varicosity, which is essentially a diseased condition. It is generally not difficult to distinguish these two classes of venous enlargement, but there are instances in which the one will merge into the other; we sometimes find veins which macroscopically would be regarded as simple dilatations, and yet which show, on more careful examination, microscopic changes in their walls.

Varix of the lower limbs is so frequently met with, that the treatment of it and its complications forms a considerable part of the work of any out-patient clinic. Wood, (2) in conducting civil service examinations for the positions of firemen and park police, found varicose or dilated veins in the lower extremities of 91 out of 2,004 applicants examined, or 4.5 per cent. The statistics of the United States army (3) on this point show that in 1904 the rejections for varix were 3.92 per cent; in 1905, 2.49 per cent; and in 1906, 2.13 per cent. Out of over two million men examined for the French army, from 1850 to 1859, inclusive, the exemptions for varices were .973 per cent. (Sistach.) (4)

My observations are based on one hundred cases of varix, under my care in the out-patient clinic of the University of California. While my findings agree in many respects with the tables already published, they nevertheless depart considerably in certain details. Our patients have been mostly men, and the larger portion have consulted us for varicose ulcer. In this service, however, the number of male patients has always been far in excess of the females; and it is a notable fact that the poor patient, affiicted with varix, does not generally seek surgical aid until some of the annoying sequelæ appear. In our hundred cases there was not one which we could attribute to a heart lesion, although this cause is commonly mentioned in surgical text-books. Miller (5) in a summary of 128 cases of varix, from the records of the Johns Hopkins Hospital, makes the same observation. Many of our patients complained of constipation, but in no instance could it be regarded as a causative factor. Abdominal tumors were met with in but 3 cases. (In 33 cases of ovarian and pelvic tumor, with varicose veins, Gay (6) found the veins apparently aggravated by the tumor in but a single instance.) Hemorrhoids were found in 10 patients. The occurrence of well-marked varicocele was recorded but 6 times. For a while, I examined the forearms of all patients for enlarged veins; but the number met with was so small that I abandoned the procedure as a routine measure. Seven patients gave a history of the appearance of the offending veins after fractures of the limbs.

Heredity has for years been counted as the most important factor in the etiology. Broussais (7) was the first, I believe, to emphasize this point and Richet (8) thought that there existed in certain cases a special predisposition by which the venous walls, already enfeebled, become hypertrophied. Berard and Denonvilliers (9) state that, in some cases, heredity plays an incontestible influence. Bennett (10) obtained a hereditary history in 74 patients out of 259 examined. Our own experience has led us to believe that such information, gained by questioning the patient, is most unreliable. The patient himself is unable to distinguish between prominent or dilated veins and the condition with which he is afflicted. We have found that his answers would largely depend on the ways in which our questions were put. There is every opportunity for the enthusiast in heredity to make a serious blunder in this connection. In three instances, however, we have treated more than one member of the same family for varix. In my review of the literature I have been interested in reading the statistics of Moreau (11) who assigns to rheumatism the chief place in the etiology. In 118 cases he found 53 with arthritic manifestations and 24 with a family history of rheumatism. Yet to-day we would hardly deign

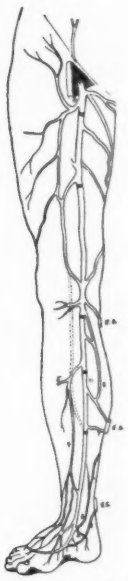
to place rheumatism among the predisposing causes. It is noteworthy, that in this series he found but 6 with a family history of varicosity alone.

I regret that the Trendelenburg (12) test was not tried in all our cases. In many, in which it was practiced, it was not done correctly, as I will later show: so I have no statistics to offer on this point. The Trendelenburg test is made as follows: The patient is placed in the recumbent position and the limb raised so as to empty the superficial veins of venous blood. The fingers are then pressed firmly over the long saphenous, just below the saphenous opening, and the patient allowed to stand; the lower veins may now fill somewhat on account of their anastomoses with the deep veins. The pressure is suddenly removed; and in most cases, if valvular incompetency is present, the blood can be seen to rush down the empty vein, again distending it. This is the usual method of employing the Trendelenburg test, and it was so applied in a large number of our cases. But Pierre Delbet (13) has shown that an internal saphenous vein, which may appear normal in size, may be the seat of valvular insufficiency. If, in such a case, the fingers be placed upon the vein at some distance below the saphenous opening, a thrill will be felt immediately when the pressure is removed, although the vein may not visibly dilate. We have found this to be so in many instances in which the Trendelenburg test, as usually applied, proved negative. The amount of subcuticular fat, interposed between the vein and the skin will make a difference with the visual perception of this test. When the varix is well marked, there is a tendency for the superficial fat to be absorbed. Delbet goes so far as to affirm that, in no instance in which a varicose ulcer was present, has he ever found the saphenous vein intact. This has not been our experience, although we have found the modified test positive in a large number of cases.

As has been generally noted in statistical records, we have found a large percentage of our patients following those occupations which require standing for long periods with little chance for exercise, such as motor-men, counter clerks, bartenders, laundry-men. Albucasis (14) has commented on the influence of occupation on the production of varix and Briquet, (15) Boyer (16) and Longet (17) have emphasized his conclusions. The disease appears to be common in those who sit for long periods in one position, particularly when the muscles of the arms are brought into play, as in hackmen and wagon drivers. Manley (18) has met with it frequently in those who use the bicycle much. This author points out that in fast bicycle riding, when the trunk is bent forward, when all the muscles are in most energetic action and the thigh intermittently flexed upon the pelvis, venous return is greatly embarrassed. deGuillejac (19) has also found the disease common in those whose limbs are accustomed to certain set motions, as bicyclists and turners.

It has been impossible to establish the age of onset in our series. The general answer has been, that the varix has been present for a great many years or as long as the patient can remember. It would seem, however, that in a majority of cases the disease has its beginning between the twentieth and thirtieth years, and that its sequelæ are noted at a somewhat later period. The average age of our patients was thirty-six. In this connection the labors of Sistach (20) are interesting. He examined 1074 French soldiers. In 956, from twenty to thirty years of age, he found 73 cases of varix, or 7.53 per cent. In 118 soldiers, from thirty to forty-six years, he found 23 cases, or 19.49 per cent. Again, Delaharpe (21) records the statistics of the canton of Vaud, Switzerland. Here the militia is divided into three parts: *le depot*, composed of boys from seventeen to ninteen years of age; *l'elite*, of men from nineteen to thirty years of age; *la reserve*, of soldiers between thirty and forty-five. The exemptions for varix were about the same in the first and third classes, but nearly double in the second class. This represents very well the age of onset, for it must be understood that the soldiers of the higher divisions had already seen service in the lower ones.

A casual survey of an injected specimen of the superficial veins of the lower limbs, or even a text-book illustration, conveys the impression that we have here a most elaborate arrangement for the return of the superficial venous blood, wholly out of keeping with the neces-



The internal saphena vein and its branches. The most common distribution of the vein is shown.

sities of the body. It has long been recognized that this superficial venous system offers to the returning blood an unobstructed passage to the heart during the time that the venæ comites are undergoing compression by the contracting muscles. We know that this contraction materially assists the onward flow of the deep venous current, for in a state of muscular relaxation the blood pressure in the veins is low. Yet, while at one moment muscular contraction would accelerate the deep venous current, it would the next moment be turned into an opposing force. If muscular contractions were rhythmical, this would not be the case and there would be no necessity for nature to provide such an elaborate system of superficial venous return. The increased volume of blood, thrown into the superficial veins by muscular action, is a matter of common observation. It can easily be demonstrated in a race-horse, fresh from a heat; and I have often observed this distention of the superficial veins in the legs of athletes, especially after middle distance runs. Slow laborious exercise will also distend the veins, but to a less degree.

In the accompanying diagram, the paths of the superficial veins are marked and the common positions of the valves indicated. These valves vary considerably, in number and position, in different individuals. Though fine and delicate structures, their power of resistance is sometimes remarkable. I have tried to force these valves in the long saphenous vein of the new born infant, but have never succeeded in doing so. The experiment is a most delicate one, for the vein is here not much larger than a coarse hair. With patience a fine needle may be inserted but the valves have remained intact, notwithstanding all the force I could bring to bear upon them with a syringe. In this connection, the extensive experiments of Klotz (22) are of great interest. He observed that, with advancing age, more and more of the valves become insufficient. In every case he found the valves intact in the fœtus and the new born. At the age of twenty-five, 17 per cent of the valves were insufficient; at forty-eight, 29 per cent; at fifty-four, 40 per cent, and at seventy, 81 per cent. In the pieces of diseased veins which I have examined, I have found in all instances that the valves had disappeared. The same observation has been made by Kræmer (23) and Venot (24).

Certain points in the anatomy are to be emphasized. Tracing the internal saphenous upward, its most constant branches, those establishing communication between the superficial and deep systems or between remote parts of the same trunk vein, are: A branch, 1, to the external saphenous, which also sends a branch to the deep plantar vein. As the internal saphenous passes over the malleolus it gives off a loop vein, 3, which receives many branches, sends other branches to the deep plantar veins and usually rejoins the trunk vein higher up. This loop vein sends a branch to the posterior tibial, 2, the inferior perforating vein. The long dorsal vein, 4, runs upon the dorsum of the foot where it communicates freely with the anterior tibial, the saphena and the plantar veins and then ascends the leg upon the outer side of the tibial spine. Sometimes this branch prolongs its course by the dotted lines to unite with the branch above, giving rise to what Viannay (25) calls a double saphenous vein. In 52 dissections, he found it present in 6.5 per cent. Its existence was first pointed out by

John Gay (26) and its bearing on the so-called Trendelenburg operation is obvious. At 5 this vein receives a large branch which connects the saphenous with the posterior tibial venæ comites.

Besides these veins, there are two others of prominence not shown in the diagram. The short dorsal vein completes the outer portion of the dorsal arch, communicates freely with the plantar veins and also the external saphenous and passes up the leg in front of the fibula for a varying distance. It sends a branch also to the posterior tibial, the middle perforating. A branch, sometimes quite large, arises on the outer side of, and immediately below, the knee-joint, where it communicates freely with the deep articular veins. This crosses the leg and unites with the saphena on its inner side. Slightly below this is a branch to the deep veins (not figured), the upper perforating. 6, A large branch as shown in the illustration. Above the knee, the branches follow in general the directions given in the diagram and a description of their paths is not necessary. The internal saphena has usually seven valves.

The external saphena is but partially drawn. Its important branches are several small veins on the outer side of the ankle-joint which anastomose with the plantar, dorsal and posterior tibial veins. About 5 or 6 cm. above the ankle is a branch from the peroneal or posterior tibial vein. 7 is a cross branch, from the external saphena to the internal saphena. A large branch, 8, runs upward and joins the internal saphena behind the knee-joint. Another branch higher up (not figured), connects the external saphena just below its termination with the internal saphena at a varying distance above the knee-joint. The external saphena has from three to nine valves.

It will be seen from the above, that the saphenæ inosculate freely with each other upon the dorsum of the foot, and also send a number of branches to the deep veins. Perforating branches to the deep veins are also to be found, just above the ankle. At the knee-joint and just below it some of the superficial veins are connected by branches with deep veins; but between a point a little above the ankle and a point just below the knee, there are but two perforating branches, the upper perforating and middle perforating, which join the superficial with the deep system. In the thigh there is occasionally found a perforating branch which passes up and joins the femoral vein. The external circumflex, superficial pubic and superficial epigastric veins, shown in the diagram about the saphenous opening, inosculate freely with the deep veins.

Clinically, we may roughly group our cases into three classes.

1. The occurrence of varices in a limb notably enlarged. Such a limb is often œdematous, or in the absence of œdema, a flabby fullness is observed when the part is raised. This flabbiness becomes hard and resistant when the limb is again lowered. Ulcers, which heal with difficulty, are frequently encountered; and areas of pigmentation, which may mark the site of old ulcerative processes, are often seen. The varicosities are most generally slight and wholly out of keeping with the sense of weight and fullness which the patient experiences when walking. The internal saphena is usually not the seat of extensive varix and is often not palpable. The veins on the dorsum of the foot and about the ankle are more or less varicose and varicosities are seen on the inner and outer side of the ankle-joint and just below it. Between the ankle and the knee-joint there may be one or two clumps of veins, varicose to a varying degree; if present, they will correspond to the positions of the middle and upper perforating veins. In other words, we have in this class varicosities of the superficial veins in the immediate neighborhood of the anastomosing branches which join the superficial with the deep system.

2. The occurrence of marked varix in a limb not appreciably or but slightly enlarged. The internal saphena is prominent especially in the leg, and its branches are frequently hard and tortuous. The Trendelenburg test is present. Old phlebitic areas and phleboliths are often found.

3. The occurrence of isolated patches of varix in different parts of the leg and thigh of a limb not appreciably or but slightly enlarged. The internal saphena may be palpable at certain points, but the Trendelenburg test is absent.

Such a classification answers, in a general way, the purpose of simplifying a very complicated subject and will be referred to later in connection with the operative treatment. It may here be noted that varix is generally more advanced in the branches of the saphenæ than in these veins themselves; also that the anatomical arrangement, as above described, is capable of great variation.

The conditions existing in our first classification lead us to inquire into the nature of the deep veins. Briquet (27) was the first to assert that, at the spots where the superficial varices are most common, large trunks communicate through the muscles with the deep veins. He finds the latter as commonly diseased as the superficial, the disease being most advanced where the intramuscular veins empty into them. Callender (28) confirms his statement. It is rather surprising that, with the increased attention that has been given to necropsies of late years, nothing has appeared on the subject of the deep veins in superficial varix. A number of observations have been made, but they date back to that distant time when varix was a subject under discussion.

Verneuil, (29) in 21 dissections, extending over a period of 6 months, states that in every case where superficial varices were discovered, deep varices existed as well. He even goes so far as to affirm that here varix is more common and that the deep veins are the first affected, the disease spreading from them into the superficial plexus, the anastomotic channels between the two sets being varicose to a high degree. His commentators convey the impression that he found the deep veins generally varicose, but he distinctly states that the plantar, the popliteal and the femoral veins are rarely affected and the anterior tibial almost never. It is to be regretted that Verneuil did not publish an account of his dissections in detail. One dissection only he mentions. This was on the body of a woman, one of whose legs contained superficial varicosities. On the opposite side, while the superficial veins were not varicose, the deep veins were markedly so. In reading his paper, one is forced to believe that his conclusions are not justified by the material which he presents.

Quénu (30) reports many cases of superficial varices in which alterations of the deep veins did not exist. Broca (31) states that he has found varix of the deep veins in cases of superficial varicosity. He has dissected a subject in which the superficial veins were intact, but where the deep veins were dilated to a very high degree. Denuci (32) found one case in which the deep veins were greatly dilated, but no dilatation of the superficial was present. Verneuil (33) quotes Deville, Fouché, and Sappey, all of whom had found the deep varices very common. Dumay (34) communicates a case in which, while tying the peroneal artery, it was found to be surrounded by large varicose veins, the walls of which were extremely thin. Briquet (35) states that he has seen one case at the Salpetriére in which, though the external parts of the legs and thighs were covered by large veins, the deep veins were free from all signs of disease. Sirus-Pirondi (36) in a letter addressed to Verneuil, says that in a year he has encountered seven times deep varices without a trace of superficial varix. In 1855, before the Anatomical Society of Paris, Verneuil (37) exhibited a specimen in which the deep veins were generally more dilated than the superficial. Gross (38) has recorded a dissection in which all the superficial veins of the leg were found to be varicose to a striking extent, as were also the deep veins, but to a less degree.

Bennett (39) believes that, in the greater number of advanced cases, the deep and superficial veins are probably involved to about the same extent. Hughes (40) has made four dissections in cases of varix and found that in each the long saphenous was varicose. The only portion of the short saphenous affected, was that part lying in the popliteal space after it had pierced the deep fascia; this was distinctly varicose in each case. He found, in no instance, any of the deep veins affected. He believes that the portion of the short saphenous lying in the popliteal space becomes varicose because it is not supported by the contracting muscles. Walsh (41) has seen one case of varix dissected and states that in this the internal veins were as tortuous and irregular as the external.

Gay's (42) work, published in 1868, is the best and most thorough which has been done

on this subject. He made in all 24 dissections, and published an extensive protocol of his findings. In these dissections, some portion of the deep veins was found to be dilated or permanently thickened in 13 instances. Dilatation of intra-muscular branches is also mentioned in 4 dissections. In 2 dissections, the external saphena presented constriction at the deep aponeurosis. Atrophy of the saphena, with deep trunk dilatation was noted in one case. This author makes reference to a fact, which is a matter of common observation, that the severity of the ulcerative process does not correspond with the extent of the superficial varicosity. Obstruction to the deep vein trunks was found in some cases. In one instance, the external iliac vein had been almost obliterated by pressure of a cancerous tumor of the uterus; the superficial veins were largely developed over the upper part of the thigh but not below. Gay believes that it is not the tributaries of a vein below the seat of obstruction that become varicose, but branches which bridge over its site. In his dissections the posterior tibial venæ comites were the most frequently affected.

From the above, there can be no doubt that the deep veins of the leg are frequently dilated; and it will be pointed out later that, where deep dilatation exists in the presence of superficial varix, these deep veins are varicose as well.

The occurrence of dilated veins in the course of pregnancy is very common. Of 300 women examined by Budin, (43) 152 were primipara and 146 multiparæ. There were 34 cases of dilated veins among the primiparæ and 66 among the multiparæ. These dilatations usually subside after pregnancy and so should not be considered as varix; but there are many instances, in which such dilated veins become varicose after repeated pregnancies. In this connection, the experiments of von Lesser (44) are interesting. He endeavored to produce varicosities in animals by introducing artificial obstructions in their veins, but was successful only in getting a compensatory dilatation, the result of venous anastomosis. It is not unreasonable to believe that varix would have in time resulted in his experiments.

A number of instances are found in the literature of cases in which large, dilated veins, called varices by some of the writers, have suddenly appeared after violent muscular exertion, as dancing, running and the lifting of heavy weights. Ambroise Paré, (45) whose keen observation is amply testified by his writings, mentions such occurrences. Bennett (46) cites the case of a male patient who suddenly felt something give way while engaged in gymnastic exercise. On examination the saphena above the knee was found to be twice the size that it was below. Manley (47) mentions a patient who, in racing on a wheel, ruptured the muscular coat of the internal saphena from the falciform ligament to the knee, the vessel attaining a diameter nearly as large as the wrist. Such instances are most interesting, for they serve to show what great pressure may be exerted on the superficial veins by muscular exertion. More will be said on this subject, in connection with the rôle of valvular incompetency in the production of varices. There is not doubt that some cases of varix have their origin in the severe muscular strain undergone in certain athletic sports, valvular incompetency resulting from overloading the vessels. I have not found this commented upon excepting in the writings of Bennett; but the frequent occurrence of varix among patients who have been most athletic in their youth would lead one to consider it as a causative factor. A perusal of the clinical facts, here set forth, leads the reader at once to the formation of a simple theory as to the origin of varices. The mechanical or physiological theory, as it is sometimes called, was for a long time generally accepted, due no doubt to the great emphasis which was placed upon it by Briquet (48). According to Briquet, the prime cause for the production of varix is the increased tension in the superficial veins. Permanent varix follows their dilatation.

Against this mechanical theory has been advanced the doctrine that varix is due primarily to a parietal phlebitis, which results in the destruction of the muscular and elastic tissues replacing them by fibrous cicatricial tissue. The cause of this alteration is laid to a diathesis, the disease being common among alcoholics, sedentary women and those who present nutritive changes. This is the theory which has been defended so ably by Schwartz

(49). Cornil (50) also asserts that, after the development of thrombosis, hypertrophy ceases and the hypertrophied elements enter into a secondary atrophy. The assumption that a special diathesis is necessary for the development of varicosity hardly seems to be warranted by the clinical facts. The disease is very common among those who are otherwise healthy, strong and robust and free from organic changes. But in many old cases of varix, dissection shows intravenous coagulation, partially filling the vessel's calibre. Often this undergoes calcareous change, and palpation of the affected vein reveals hard nodes (phleboliths) obstructing the lumen. Sometimes inflammatory changes will entirely obliterate a vein, the so-called radical cure. Certainly, there is much which can be said concerning the presence of phlebitis in varix, the only question left open being its place as a causative factor.

One clinical fact of considerable importance I wish to mention before seeking, in a microscopic study of varix, a settlement of this question. In some cases after operation, especially when the internal saphenous has been tied or a portion of it has been excised, the blood will be shunted through collaterals and a venous anastomosis formed. Clinically, this is first marked by a slight dilatation of the branches involved; after a while this dilatation becomes greater and finally an hypertrophy of the coat is observed, for the vein walls are thicker when picked up between the thumb and forefinger, and more resistant to pressure. In the course of time, the walls increase and may become tortuous from the growth of connective tissue; our anastomosis is now a typical varicosity. Here it can hardly be claimed that a phlebitis was the point of origin, for it was simply mechanical pressure, the necessities of the circulation, which developed the anastomosis. We can believe that venous dilatation is the first step in the development of a superficial varix, the result of abnormal blood-pressure. What tissue changes occur to offset this increased blood-pressure has been determined by a careful study of specimens microscopically. Many of the sections for this work have been prepared for me by Dr. Harry Everett Alderson.

Resistance against increased blood-pressure is first made by the elastic tissue in the walls of the vein. An hypertrophy, sometimes most pronounced, results. Even this hypertrophy is often insufficient and the vein will continue to dilate, the walls becoming quite thin. The muscular tissue then begins to hypertrophy in order to overcome this dilatation; and the thin walls may, after a time, become quite thick. The vein may also assume a tortuous course, due to its unequal development. Agnew (51) has likened such a vein to the course of a river and he says, "The effect of one curve is to reflect the circulating current forcibly against an opposite and higher point of the vein and to cause another curve in that direction. A bed may be cut for a stream whose sides are geometrically parallel, and yet, if left unrestrained, it will soon groove out for itself a channel like the trail of a serpent, because a slight indentation was formed on one of its banks." Such a comparison is more fanciful than real, for the vein in its pathological development in no way follows the geological laws which govern river channels.

In my examination of specimens, I have never found in veins with thin walls, where thrombus was not present, the muscular layer atrophied, but sometimes it has been a little hypertrophied. Soboroff (52) has recorded the same fact. It is to be noted also, in the greatly dilated veins in which the walls do not seem to be thickened, that a considerable hyperplasia and remarkable elastic hypertrophy exist microscopically. The elastic tissue is much more hyperplastic in veins with thick walls than in those in which the walls are thin; but this hypertrophy does not always compensate for the dilatation present, The deep veins, secondarily thickened, are yet nearly always distinctly dilated as compared with normal veins. Muscular tissue may also develop in great quantity in the adventitia. Pilliet (53) has noted a specimen in which the vessels of this coat were distinctly dilated and engorged with blood. There may be also a bed of new formation, of variable thickness, developing in the intima and enclosing the lumen completely or partially.

We find, then, hypertrophy in all the layers of the vein, the purpose of such hypertrophy being to meet the augmented blood-pressure.

In many instances compensation is established, but the lumen is nearly always slightly dilated. If the venous pressure continues to increase, the lumen of the vein redilates and the elastic and muscular tissues of the new formed layers begin to atrophy and disappear. This secondary atrophy has been especially emphasized by Epstein. (54) When this occurs, a thrombus may form or the wall may break. In the presence of thrombus, degeneration of the intima is frequently noted; also sometimes that of the media and occasionally that of the adventitia. But it does not follow that the thrombus, composed as it is of coagulated blood, fibrin, and leucocytes, is a direct consequence of the degenerative process in the wall of the vein. Broca (55) lays stress on trauma and fatigue as determining causes; and many other causes, both local and general, are cited by him. It is possible that the atrophy of the intima which is present directly provokes the blood stasis and thrombus formation; at any rate, we are led to believe, from the presence of thrombus in a section, that it serves as a protective to the degenerated walls.

Menahem Hodara, (56) whose work on this subject in Unna's clinic is most extensive, has examined several specimens in which the walls of the vein had broken down. In these sections the blood, which by destruction of the walls is in contact with the tissue, is retained by a thick layer of new formation which is thrown around the defective part. This blood proceeds, destroying a portion of its artificial barrier, and advances but slightly before it is again stopped by a new circle, probably formed after rupture of the first. By this process the lumen of the vein is slowly and irregularly enlarged. The blood circulates perfectly and there is no evidence of thrombus formation. The process, in general, is the same for all the veins but local tissue differences produce variations in the histological picture at different levels. The greater resistance of the cutaneous tissue, rich in elastin, permits but very slow progress. On the other hand, the relaxed subcutaneous tissue, poor in elastin and already possessing a quasi-cavernous character from the presence of adipose tissue, allows of greater inroads.

Contributory causes to the development of varix have already been mentioned and, outside of occupation which has been commented on at length, they may be classified as follows:

1. Obliteration of a large vein, generally a deep one, by thrombus following typhoid fever and other diseases.

2. Obliteration of, or pressure on, a large vein or veins as the result of fracture. As already stated, this was observed in seven cases of our series.

3. Interference with the return circulation by the pressure of constricting bands, such as elastic garters, commonly worn by men above the calf. This I regard as a most important secondary factor in those cases in which a tendency to the disease already exists. Bennett (57) affirms that fully 25 per cent of his cases were due to this cause. Freer (58) has observed such a number of cases of varix develop quickly in British troops, who have seen active service in South Africa, that he believes it to be due largely to the improper adjustment about the legs of the putties commonly worn. Garters, as a causative factor, was noted frequently in our series and the following case, seen in private practice, well illustrates this point.

A commercial man of thirty consulted me for pain in his legs. He described a peculiar numbness, hardly noticeable in the morning but getting worse gradually as the day advanced. On the least exertion, there was more or less aching in the calf muscles and, sometimes, persistent cramps. On examination, I found that he wore rubber garters above the calves; he stated that he had been wearing them for about two months time. The legs were of medium size, the superficial veins distended with blood, especially on the dorsum of the foot, and some were varicose. The walls of each internal saphenous seemed slightly thickened, but the Trendelenburg test was absent. The patient stated that he thought the veins had become enlarged while at college; he had taken an active part in athletics, especially upon the track. I advised him to dispense with the garters and he has not since been troubled with these annoying symptoms.

4. Interference with the return circulation by the pressure of tumors. This, as has already been stated, is rare.

5. Gay, (59) from his many dissections, was led to conclude that constriction produced on the veins by certain foramina, such as the saphenous opening, was at times a contributory cause in the production of varix. Sistach (60) emphasizes the fact that, in certain cases, the varicosities would seem to be the result of strangulation at the aponeurotic or fibro-muscular orifices. Herapath (61) has even gone so far as to advocate a widening of the cribriform fascia which gives passage to the saphenous vein.

6. Pressure of venous blood, resulting from valvular incompetency. This is, by far, the most important and the most common of the contributing causes. Trendelenburg (62) has emphasized its bearing in relation to varix and his test is founded on his accurate knowledge of the hydrostatics of the condition. It is, by far, the most useful physical sign in connection with the disease.

At this point, attention must be drawn to a remarkable experiment of Pierre Delbet (63) I have not had the temerity to repeat this experiment, though I have much wished to confirm his observations, for it is not without great risk to the patient. Having resected the internal saphena in a strong, healthy man in which the Trendelenburg test was present, Delbet proceeded to measure the blood pressure by introducing canulas into the central and peripheral ends of the vein and connecting them with manometers. He states that the conditions were all admirable, the blood did not coagulate in the tubes and the patient did not exhibit any ill effects from the experiment. Readings were taken simultaneously on the two manometers, with the patient lying down, during muscular effort while standing, and under very violent muscular effort in the same position. The readings are as follows:

	Superior Segment	Inferior Segment
Patient lying down	1.6 cm.	3 cm.
Muscular effort standing..	16. cm.	6 cm.
Violent effort standing....	26. cm.	10 cm.

Thus we see that, under violent effort, the pressure is raised in the central end to 26 cm., truly an enormous pressure. The pressure in the inferior segment can be considered that of a normal saphenous vein; and we find that, on violent effort, it is raised from 3 cm. to 10 cm. Normal arterial blood-pressure, at middle age, is given by Krehl (64) at from 10 to 13 cm., although muscular exertion markedly increases it. The experiment not only emphasizes the importance of the Trendelenburg test, but gives us some idea of the enormous increase in tension of the blood in the superficial veins during muscular exertion.

It is related by Plutarch that Marius, the Roman dictator, underwent an operation for the removal of varicose veins, as they spoiled the appearance of his calves. The dictator stood bravely the pain of the operation on one leg; but, when the surgeon was about to proceed with the other, he stopped him saying that the improvement in appearance would not compensate for his suffering. While it is not probable that, at the present day, a patient would be actuated, by the motives of Marius, at the same time there is a small number of patients in which the symptoms are certainly exaggerated. We have a like, but much larger class, afflicted with varicocele in whom only radical removal will suffice to free their minds from the mental worry attendant on the trouble.

The symptoms from which the varix sufferer generally complains are as follows: Pain in the legs, hardly appreciable in the morning, but gradually increasing as the day advances; there may also be a general numbness in the extremities, cramps in the legs or great itching of the skin, especially toward night. Œdema is seen in many cases and trophic changes are gradually developed. The skin of the leg may be hard, of a dark red to a bluish hue, and very liable to inflammatory conditions, especially to eczema. The muscles become relaxed and atrophic, and the patient is soon fatigued. Flat-foot is noted frequently in connection with varicosities on the legs.

The patient often wishes to know, for it is of great importance to him, how much exercise he should take and what kind. He has himself learned that long continued standing is productive of great discomfort. If his occupation is one that requires this, the question of a change of employment should be considered; although at the middle or later periods of life, when the results of varix are so frequently

encountered, such a course is apt to produce great hardship. The surgeon has learned that his cases of ulcer heal more quickly when the patient is confined to his bed and the limb is elevated; but in a large number of moderate cases of varix, uncomplicated by ulcer, exercise is of distinct benefit. Exercise should be conducted very carefully, and must be regulated so that all the sets of muscles may in turn be brought into play. Standing in one position for long periods is injurious, because the muscular strain is thrown upon the same vessels. Horseback riding is not generally good, as the return circulation is retarded by the pressure of the saddle. Sistach (65) found in the examination of French soldiers that varices were less numerous in the troops on foot than in those on horseback.

Let us now revert to the three clinical classifications and consider their significance from the stand-point of operative interference. The first class included those cases in which the limb was notably enlarged and in which symptoms were prominent, especially œdema. In such limbs, varix of the superficial veins is not general but is confined to those localities which mark the anastomosing veins between the superficial and the deep systems. Legs of this character are prone to skin changes and ulceration. The subjective symptoms, which we have learned to associate with the disease, are wholly out of keeping with the amount of superficial varix present and the patient is a true sufferer. This class of varix is the most persistent and stubborn with which we have to deal, for it points to an involvement of the deep veins. Operative procedures on the superficial varicosities are worse than useless, unless thin-walled sacculations are present which threaten to break down. Rest in bed, with elevation, and treatment of the skin lesions, are the only resources at our command. A well-applied muslin roller or an elastic stocking gives great relief. It is the belief of some surgeons that any case of varix which is relieved by mechanical support will be benefitted by operation. The falsity of such a doctrine is apparent.

Our second classification includes those cases in which there is no apparent extensive involvement of the deep veins and in which the Trendelenburg test is present. Our successes in operative interference belong to this class, if the operation is attempted with certain ends in view. The very multiplicity of operative methods is a good indication of the unsatisfactory results which most of them give. An absolute cure of varix is, at all times, an impossibility. All that we can hope to do is to transform veins of high tension to those of low tension; or, in other words, do away with the bad effects produced by venous incompetency.

In our third class of clinical cases are placed those in which isolated patches of the disease occur, but in which the Trendelenburg test is absent. In such conditions the internal saphenous vein may be unaffected and the valves still competent. More often, however, the vein shows evidence of disease, but nature has effected the so-called radical cure by an obliterative phlebitis. Yet I have several times seen total excision performed in such cases and in one instance high ligation with resection. In this third class relief can sometimes be afforded the patient by the excision of varicose packets, which by pressure may give rise to annoying symptoms. If such varicosities occur at the large anastomosing branches which join the superficial with the deep veins, it is probable that the deep system also is involved and operative interference is not indicated, excepting where rupture seems imminent.

Of the various operative procedures, the so-called method of Trendelenburg stands out most prominently for it is the only one in which a sufficient number of cases have been followed to establish thoroughly its claims. The operation, which Trendelenburg described, consisted simply of division between ligatures of the internal saphenous in the lower third of the thigh. This procedure was not original with Trendelenburg, for venous ligature was practiced by Everard Home (66) as early as 1799, and later in England by Annandale. Trendelenburg revived and popularized the operation, and by his test clearly fixed its indications and its limitations. The operation, as now generally practiced, is far different from Trendelenburg's description. It consists in resecting a variable length of the internal saphena well up toward the saphenous opening. The results are much better with this high opera-

tion, as there is less danger of the blood column being established by venous anastomosis; but it has led to confusion concerning the statistics, many of the authors having confounded the original procedure and the improved high operation. The following have followed cases for a variable length of time and have reported permanent results: Tobold, (67) 9 cases; Hippmann (68) 13; Charrade, (69) 13; Estienny, (70) 8; Cordebat, (71) 15; Prawdoluboff, (72) 12; Perthes, (73) 87; Faisst, (74) 15; Studsgaärd, (75) 8; Schelkly, (76) 10; Buhl, (77) 10; Zeller (78), 60; Goedecke, (79) 44; Goerlich (80) 69; Boecker, (81) 38; Kennedy, (82) 14; Miller, (83) 41. The number of successes from this operation are given by Zeller as 76 per cent; Perthes, 77 per cent; Faisst, 80 per cent, though his cases were treated largely by multiple excision; Goerlich, 84 per cent, and in his extensive review of the literature since 1892, he averages the successes at 75 per cent; Boecker, 56 per cent; Miller, 78 per cent.

Viannay (84) has pointed out the dangers of low ligation, the blood coursing through anastomosing channels; the presence sometimes of a double saphenous must also be remembered. Paul Delbet's (85) method of performing the operation is to be commended on account of its rapidity, neatness and simplicity. With the patient under local anæsthesia and having determined the path of the internal saphena, he pinches it up between the thumb and index finger, making a fold parallel to the axis of the limb and containing the skin, the fat and the vein. His assistant holds up the other end of the fold. He then passes a bistoury through the base of this fold and cuts upward, sectioning all structures, and without releasing the fold he places a Kocher hæmostat on each cut end of the vein. These ends are then pulled out and ligatures tied as deeply in as possible, and all the vein in front of them resected. In this manner a segment of vein of 5 or 6 cm. in length can be removed. Resection of the saphenous insures against regeneration of the vein, cases of which have been reported by Langenbeck, (86), Perthes, (87), Velpeau, (88), Grzes, (89), Ledderhose (90) and Miller (91).

The only other operative method which is at all established is the total extirpation of the internal saphena, sometimes called the operation of Madelung. (92) This, with various changes in technic, seems to be the operation of choice in this country; and an impetus has lately been given it by an ingenious instrument of Charles H. Mayo's (93) for facilitating the removal of the vein. Unfortunately, few cases have been followed, the only statistics with which I am familiar having been furnished by Boecker. (94) This author has performed the operation forty times with 88 per cent of successes. In talks which I have had with various surgeons, who have long practiced this method, the number of successes has been variously estimated from 60 to 70 per cent. The operation is more serious than that of high ligation and entails a longer rest in bed; furthermore, a careful consideration of the pathology of the disease does not seem to warrant its employment.

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THE SEQUENCE OF THE PATHOLOGICAL CHANGES IN APPENDICEAL PERITONITIS [1]

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That in appendiceal peritonitis, as in all other acute inflammatory processes, we have to do with a complex sequence of changes, in which the essential characteristics of the pathological picture vary from day to day, during the course of the disease, has long been a well-known fact; while in recent years, the clinical experience of Ochsner, and many others, has overwhelmingly demonstrated that, under favorable conditions of treatment, the vast majority of even the severer cases of peritoneal infection run a quite definite clinical course, characterized by the rapid subsidence of the peritoneal symptoms, and ending either in the ultimate resolution of the inflammatory process, or in the formation of localized peri-appendiceal abscesses.

During the past two and a half years, the writer had the opportunity to observe, both clinically and at operation, a relatively large series of cases of appendicitis, the great majority of which had, previous to the time of operation, been treated under approximately uniform conditions. The clinical course of the disease in all of those cases not immediately operated, was such as to leave no doubt but that we were dealing with a relatively uniform sequence of pathological changes, and the entire series has been studied with the idea in view of tracing, as far as possible, the sequence of these pathological changes.

Such a study of the pathological history of appendiceal peritonitis resolves itself into a study of the progress of the processes of inflammation and repair as they occur in this disease, and a knowledge concerning the progress of these processes can best be obtained by a combined clinical and pathological study of a sufficiently large series of cases, tabulating the pathological findings according to the time which has elapsed between the onset of the infection, and the observation of the pathological conditions. The essential features of the lesions, as observed at operation during each of the succeeding periods following the onset of the infection, were, in this series of cases, of a remarkably uniform character, and the fact that the features prominent at one period were found to be either increased or diminished in preceding or in subsequent periods has made it possible to trace, in a quite satisfactory manner, the course of the processes of inflammation and repair as they occurred under the conditions obtaining in these cases.

It is the object of this paper to outline this sequence of the pathological changes in so far as it has been possible for the writer to trace them by this method of study. The following statements are based upon a study of the condition of the peritoneum as observed at operation in 162 cases of acute, and 331 interval and chronic cases of appendicitis operated at St. Mary's Hospital and on Dr. A. J. Ochsner's [1] service at the Augustana Hospital, Chicago, during my service as pathologist and interne in these institutions; together with 41 cases of appendicitis which have been operated by Dr. McMullen and myself at the Ellis Hospital, Schenectady, since July 15th, last. As a control series, I have made use of my previously reported study [2] of the operative findings in 485 cases operated at the Albany Hospital during the six years previous to 1905; making in all 1,019 cases studied with reference to the pathological course of the intraperitoneal changes in this disease.

As a rule, but little difficulty was experienced in determining, approximately at least, the time of onset of the peritoneal infection, for in the majority of the cases peritoneal symptoms became well marked during the first thirty-six hours of the attack, and in those cases a clinical history of an acute exacerbation of peritoneal symptoms, occuring some time after the onset of the attack, ample evidence was usually found of the engrafting of a newer upon an older lesion.

The uniformity in the pathological findings from day to day in the Chicago and Schenectady cases must, in part, be ascribed to the fact that in all those cases not immediately operated, every effort was made to limit the further spread of the infection by peristalsis, for in those cases in which this line of treatment [3] was carried out, there was never any evidence of the engrafting of an acute

[1] The writer wishes to acknowledge his indebtedness to Dr. A. J. Ochsner and the Visiting Surgeons of St. Mary's Hospital for the opportunities offered to carry out this study.

[2] Stanton, E. Mac D., The Sequence of the Pathological Changes in Appendicitis. Journ. Am. Med. Assoc., June 10, 1905.

[3] The line of treatment carried out in those cases not immediately operated can best be illustrated by citing the routine orders governing their management, which were as follows:

1. Nothing by mouth (This order was absolute, and prohibited even sips of water).
2. Gastric lavage if patient vomited after entering hospital.
3. Nutrient enemas. (These enemas usually consisted of normal salt, ozIii–vi, with liquid peptonoids, oz. i, and deodorized tincture of opium m. xv, and were given every four hours. The deodorized tincture of opium was omitted as soon as the pain had subsided, and more recently, in the Schenectady cases, the liquid peptonoids have been en-

[1] Read before the Annual Meeting of the Medical Society of the State of New York, Albany, Jan. 28, 1908.

diffuse upon an older, more localized lesion,[4] while in the relatively few cases in which food and cathartics had been given by mouth previous to the patient's entrance to the hospital, this condition was repeatedly encountered; the character of the newer lesion corresponding in time to the clinical history of an acute exacerbation of the symptoms which had in nearly every instance followed directly upon the giving of a cathartic or an increase in the patient's diet. The sequence of changes as observed in this study was so uniform that the writer believes the following statements to represent accurately the course of events in the vast majority of cases in which the peritoneal surfaces are kept at rest by appropriate methods of treatment; but there is every reason to believe that active peristaltic movements, however produced, tend to complicate the lesion, not only by actively spreading the infection, but by interfering with the process of repair.

In a study of this kind, cases of appendiceal peritonitis can be divided into two quite sharply defined groups: *First*, those cases in which the primary intraperitoneal exudate is essentially fibrinous in nature, and thus a dry exudate, and, *Second*, those cases in which the intraperitoneal exudate is from the first, or almost from the first, of a serous or sero-purulent type, and thus essentially of a fluid nature.[5]

In the group of cases not primarily accompanied by fluid outside of the appendix, there was usually present a more or less extensive dry fibrinous or fibrino-purulent periappendiceal exudate, forming adhesions between the appendix and the surrounding viscera, chiefly the omentum, but also commonly involving, to a greater or less extent, the lower end of the caecum, the parietal peritoneum in this region, and often one or more loops of the small intestine. Such adhesions, if their formation and stability be not interfered with by mechanical means, serve to limit the spread of the infection from the appendix, even though suppuration should later occur in its immediate vicinity. Evidences of the organization of this fibrinous exudate were first noticed on the third day, and this process of organization was well advanced by the fourth or fifth day, highly vascular granulation tissue having by this time largely replaced the primary exudate. Coincident with the beginning organization, there was usually also evidence of a rapid absorption of the exudate, so that, in the absence of continued or repeated infection, it is believed that this type of lesion rarely results in the formation of extensive, permanent organized adhesions.

In a certain percentage of this class of cases, the character of the infection from the appendix was of such a nature as to lead to the later formation of a fluid, purulent exudate in the immediate vicinity of the appendix, which exudate was from the first limited by the fibrinous adhesions. Under these circumstances, the wall of the pus cavity is formed, during the first three or four days, by soft, very easily ruptured fibrinous adhesions. As in the cases without free pus, organization of these fibrinous adhesions was first noticed on the third day, and the fibrin was very rapidly replaced by the granulation tissue, so that by the sixth or seventh days, true abscess cavities were encountered, surrounded by the usual granulation tissue. Clinically, when these cases were treated with the idea in view of limiting, as far as possible, mechanical factors which might interfere with the stability of the adhesions, there was never any evidence of a marked tendency for this type of lesion to spread beyond its early limits.

In sharp contrast to the class of cases described above, is the second group in which from the first, or almost from the first, the dominating intraperitoneal exudate is fluid in character, with, during the first few days of the attack, little evidence of a localization of the area of inflammation. It is this group which comprises the cases having a clinical history of early diffuse peritonitis, often of an alarming character, and yet, even in these cases, there can be no doubt but that every tendency of the inflammatory process itself, is toward the localization of the lesion: for it was in these very cases, provided only that disturbing mechanical factors were eliminated, that we encountered a most definite and uniform process of localization of the inflammatory area

tirely omitted, the enemas consisting simply of normal salt with the tincture of opium added when necessary.)

4. The head of the bed was elevated at least twelve inches, and the patient inclined toward the right side by means of pillows.

5. A large moist boric dressing to abdomen, or a large cotton dressing. (The boric dressing seems at times to add to the patient's comfort, but the dressings, of whatever kind, are used chiefly because their presence tends to keep the patient more quiet in bed, and at the same time they largely overcome the temptation to make frequent and meddlesome physical examinations.)

6. Morphine hypodermically if patient was restless or in pain. (This was seldom necessary, except during the first night following admission to the hospital.)

7. Soap-suds enemas, beginning after about the fourth day and repeated, as a rule, every morning subsequently.

[4] In the 191 acute cases dealt with in this series there were but 3 deaths or 1.57 per cent.

[5] The character of this primary exudate may depend largely upon the extent of the destructive lesion in the appendix itself, but fluid exudates frequently occur without gangrene or actual perforation, and cases have been observed with extensive gangrene which must have existed for several days, without the presence of peiappendiceal pus, showing that other factors, such as the resistance of the patient, peristaltic movements, and the virulence of the infecting organisms must play an important part in determining the character of the lesion during the early stages of the inflammation. Instead of finding gangrenous and perforated appendices, associated with an extensive and severe periappendiceal peritonitis, it is the rule in the above mentioned clinics to find very limited peritoneal involvement, in spite of the most extensive destructive lesions of the appendix itself, in all of those cases referred by physicians who have from the first directed their treatment toward the prevention of the mechanical spread of the infection.

as shown by both the clinical course of the disease and the pathological findings.

This class of cases presented such a striking uniformity in the essential characteristics of the intraperitoneal lesions, as they were encountered at operation, during each of the succeeding periods following the onset of the infection, that the pathological conditions will first be described as they have been encountered during each of these periods.

In cases operated during the first day, the intraperitoneal exudate was of a serous or sero-purulent type. Fibrinous limiting adhesions were not present to a noteworthy extent, or were present only in the immediate vicinity of the appendix, which was often more or less completely surrounded by lightly adherent omentum. Beyond a more or less intense congestion of the blood vessels of the peritoneum, there was little, if any, noteworthy alteration of the serous surfaces themselves.

In cases operated during the second day, the intraperitoneal exudate was usually of considerable extent, and of a distinctly sero-purulent or purulent character. The absence of well-defined limiting adhesions was still noticeable, and the diffuse character of the lesion, in sharp contrast to the definitely circumscribed periappendiceal abscesses seen at a later period. The peritoneal surfaces already showed more or less loss of lustre, with here and there adherent flakes of fibrin, but they did not, as yet, show the marked roughening seen after the beginning of organization of the third and fourth days.

In cases operated during the third day, the intraperitoneal exudate was of a distinctly purulent character. The gross changes in the involved peritoneum, especially in the immediate neighborhood of the appendix, were now very noticeable, due in part to the more abundant fibrin, and in part to the changes in the peritoneum incident to the beginning organization, which seems in all cases first to become noticeable on the third day following the involvement of any given area of peritoneum. Limiting adhesions were now fairly well developed in most instances, but the lesions were, as yet, of a decidedly diffuse character, the area involved being much more extensive than at a later period; and there was as yet little or no evidence of the formation of sharply defined abscess cavities. It was at this time that the pus was encountered, extending irregularly between the various structures lying within the area of peritoneum involved.

By the fourth or fifth days the process of organization was well established, the previously existing fibrinous adhesions becoming replaced by organizing granulation tissue, which was also noticeable over the surfaces of the peritoneum in direct contact with the purulent fluid exudate. This granulation tissue serves to encapsulate the pus, and it was from this time on that the formation of definitely defined abscess cavities was observed, they being at first usually more or less multilocular, but later becoming more localized to form, usually one well-defined cavity. The first evidences of the formation of a true abscess cavity were observed on the fifth or sixth days following the onset of the infection, although it was not until the seventh or eighth days that the cavities became sharply defined with limiting adhesions firm enough to permit such manipulations as the packing away of the non-involved intestines, without great danger of accidentally opening the abscess at some undesired point.

The number of cases accompanied by pus outside of the appendix showed practically no increase after the third day, and, except in those cases giving a clinical history of a later acute exacerbation of peritoneal symptoms, there was no evidence of an increase in the area of peritoneum involved after this time. On the contrary, after the process of organization was well established, on the fourth or fifth days, there was every evidence of a progressive diminution in the extent of the peritoneal involvement, which became less extensive as the abscess cavity became sharply localized, and limited by the organizing adhesions.

This phase of the repair process which results in the more or less complete resolution of the peritoneal lesion beyond the immediate wall of the abscess was well shown in a number of cases coming to operation on the tenth and eleventh days, the clinical picture in each having been on admission that of a severe diffuse peritonitis. In these cases, the abscess cavities were surrounded by a narrow zone of organizing adhesions, while the peritoneum of the ascending colon and nearby loops of small intestine beyond the wall of the abscess cavity, although non-adherent, was thickened, reddish, and distinctly granular, without fibrin or other evidences of an acute lesion. The clinical picture was, on the third and fourth days, undoubtedly that of a diffuse peritonitis, and this view was confirmed by the pathological findings, as observed later at operation, although by the tenth or eleventh days the diffuse lesion had so far cleared up as to leave but slight, though unmistakable, evidences of its having existed.

After the tenth day the adhesions were found to be increasingly firm and of a highly vascular type, thus often increasing the difficulties of operative work to a considerable extent. It is also about

this time, or a little later, that one begins to encounter secondary fistulous openings into the intestine, and the other complications caused by the tendency of the pus to seek avenues of exit of its own.[6]

As practically all cases accompanied by abscess formation were operated before the close of the second week, it has been impossible, in this study, to trace the further progress of this class of cases when not operated; but, judging from the histories and the pathological evidences still persisting in many of the chronic and interval cases, the ultimate resolution, without operative interference, of even this type of lesion is of more frequent occurence than is generally supposed.

Tracing this sequence of changes from a purely pathological viewpoint, we find three stages of the disease, corresponding in clinical experience to periods showing wide differences in operative mortality. During the first stage, we find that when the peritoneal lesions exist at all, they are, as yet, not associated with marked alterations of the peritoneum itself, the lesions being of such a type as to require, if at all, only temporary drainage. After the full development of the peritoneal infection, on, as a rule, the second or third day of the attack, and until the diffuse lesion subsides or becomes a localized abscess on about the eighth day, we find the intraperitoneal conditions of such a nature that removal of the appendix is, of itself, by no means curative, at least as regards the peritoneal infection, while this dominating peritoneal infection is essentially of a diffuse character, at best difficult and often impossible to drain efficiently, and but doubtfully benefitted by operation. On the other hand, by the eighth or ninth days the peritoneal lesion in the milder cases has already largely disappeared, while in the more severe pus cases the condition encountered, no matter how great the quantity of pus may be, is essentially an abscess cavity, the drainage of which is a simple and satisfactory surgical procedure.

There can be no doubt of the advisability of operative interference previous to the time of the development of the peritoneal infection, nor is there any doubt of the satisfactory results and low mortality of operative work in the stage of localized abscess formation. The high mortality of operative interference between these two periods is known to all, and the clinical results of Ochsner and many others now overwhelmingly demonstrate that, with proper methods of treatment, the vast majority of cases seen first during the stage of the diffuse lesion can be carried over for operation at a later, more favorable period. The almost absolute uniformity in the progress of those processes leading up to the localization or resolution of the peritoneal inflammation, as it was observed in this study, has served to convince the writer that the claims of those advocating conservative treatment during certain stages of acute appendicitis are founded upon a much more definite pathological basis than is generally recognized by the profession at large.

In conclusion, the writer wishes to emphasize the fact that the distribution of an intraperitoneal infection is, for the most past, dependent upon purely mechanical factors, and that in the absence of peristaltic movements, such as are produced by giving food or cathartics by mouth, the tendency of a localized peritonitis, even of appendiceal origin, to spread beyond its original boundaries is very slight indeed, while, when a condition of peritoneal rest is once obtained, the vast majority of cases of extensive and severe appendiceal peritonitis show a rapid localization of the inflammatory process, which either subsides entirely or ends in the formation of a localized abscess.

[6] As a matter of fact, this class of complications was of no importance in this series of cases, and this statement is based on a partial study of the cases reported in the literature dealing with this phase of the subject

BREECH PRESENTATIONS: AN ANALYSIS OF 250 CASES OCCURRING AT THE BOSTON LYING-IN HOSPITAL[1]

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THE material for this paper is 250 cases of breech deliveries which have occurred at the Boston Lying-in Hospital from August 1, 1887, to November 14, 1907. Breeches occurring in multiple pregnancies, in premature cases and in macerated fœtuses I have eliminated, for statistics with these included are of no value.

There were 143 cases in primiparæ, 57.2 per cent — a much larger proportion than we are led to believe from the text-books. The following table gives an analysis of the positions found.

Position.		Footlings.	Double Footlings.
S. D. P.	27	9	2
S. D. A.	49	8	4
S. L. P.	35	6	4
S. L. A.	73	15	6

No record of 12 cases.

These figures on the relative frequency of the positions differ considerably from the accepted ones. Edgar, in his "Practice of Obstetrics," quotes Naegele as finding sacrum left anterior in 120 out of 163 breech presentations, 40 being sacrum right posterior. In other words, he says the breech practically always engages in the left oblique diameter. Edgar apparently agrees with Naegele, for he adds that sacrum, right anterior and left posterior are rare. Reynolds and Newell, and Williams, on the other hand, say the two latter are the commonest, i.e., the breech engages in the right oblique diameter. It is clear from the cases in this series that there is no such preponderance of one diameter over the other. Sacrum left anterior is the most common, but sacrum right anterior and left posterior are by no means rare.

Ether was given in 108 cases; and in 111 the patients delivered themselves. (By "delivered themselves" I mean that there was no traction applied or practically none: the baby simply being carried upwards in the curve of Carus prolonged. In all cases an assistant was present to give intelligent suprapubic pressure.) Twenty-three times the delivery was slightly aided at the end, and in 4 cases no mention of what occurred is recorded. In 112 cases manual extraction was resorted to. In a great majority of cases the records failed to show the exact cause for operating and, therefore, no attempt has been made to tabulate the causes of extraction. The methods used were: by foot and leg, 90; by finger in groin, 19; by blunt hook, 2; by forceps to breech and fillet, 1. Forceps to the breech was twice attempted, but both times failed. Forceps to the after-coming head was applied 14 times, and of these cases, 9 babies were born alive and went out of the hospital well; 5 were lost. Five times forceps was attempted but failed. Three babies were finally extracted manually alive and one dead: and on one a craniotomy was necessary. In these cases of manual extraction there was no extension of the arms in 58; both were extended in 32; one only in 5; and in 5 there was a posterior displacement of the arm. The deaths which occurred in the manual extraction cases, I shall take up in a moment from a different point of view, as some were in no possible way due to the fact that an extraction was performed.

Extensive laceration of the maternal soft parts is noted as one of the increased dangers to the mother in breech presentations. In this series, the perinæum was found intact 36 times; slight tear, 62, moderate, 35, and no fresh tears in 59, a total of 192 cases, where obviously there was no marked increased risk over vertex presentations. In 11 there was no record of the condition of the perinæum. In 27 there were bad tears; and 11 in which the tear extended to the sphincter. In 9 there were complete tears through the sphincter. There is no question but that occasionally the tears may be extensive and this fact should be recognized in any prognosis that is given. In

[1] Read in part by invitation at a meeting of the Obstetrical Society of Boston, December 17, 1907.

the complete tears all but two had entire control of both gas and fæces on leaving the hospital. One had control of fæces but not of gas; and one had a small recto-vaginal fistula.

I did not find the temperature charts of nearly 20 of the early cases, and in the remaining cases there were 10 cases of sepsis. None was fatal, none was severe; all were discharged well. Eight showed uterine sepsis and the infection was readily controlled by intra-uterine douches. Two of these cases were probably gonorrhœal. In 2 the perinæum was infected and the stitches were removed. There were 4 cases of phlebitis in three patients: one, a very slight pelvic affair which cleared up in 4 days; the second followed a septic case, first the left leg and then the right was involved; the fourth case was left-sided in a case of antepartum bleeding of some days duration; this cleared up entirely in 9 days.

There were 2 cases of placenta prævia; in one the mother died, the only maternal death in the series and can in no way be laid to the breech presentation. She was sent to the hospital with a pulse of 132, blanched, and in very poor condition. The baby was dead before operation was undertaken. In the second case the mother made a good convalescence, but the baby was sacrificed by a slow manual extraction, not recovering from the pallid asphyxia.

Postpartum hæmorrhage occurred 10 times, once from the cervix, the rest from the uterus. Twice the uterus and vagina were packed, but in the other cases less radical means controlled the bleeding. No cases died and no sepsis followed.

I have already spoken of the extension of the arms in the manual extractions. In the whole series the figures are: no extension, 164; both extended, 51; one extended, 12; no record, 23. It is clear from these figures that extension of the arms is much more common in extraction cases, as is well recognized, and, that further, when one arm is found to be up, in a great majority of cases the second is also extended. In no case did the chin rotate to the symphysis.

There were 5 fractures of the femur; 4 occurred during manual extraction; 2 when extraction was done by traction on the foot and leg; and 2 when a finger in the groin was the method used. There was one fracture where there was no extraction. The humerus was fractured twice, both in manual extraction cases, and in both the arm was extended, and once it was displaced posteriorly. Four clavicles were broken: all where the arms were extended and where an extraction was done. There was also one separation of the lower epiphysis of the femur; and one separation of the dorsal vertebræ from excessively hard traction on the trunk. Obstetrical paralysis was found 6 times, all but one of which were in cases where the arm was extended.

Craniotomy was done twice, both times in contracted pelves. Hydramnios was present only twice, and a contraction ring was noted but 5 times. Asphyxia pallida occurred 23 times, and death of the baby followed in 10, showing how serious a condition it is. Hæmatoma of the sternomastoid muscle was seen but once, and was right-sided. Hæmorrhage of the new-born was present 3 times, was fatal once; and there was one fatal hæmorrhage from the umbilical stump.

There were 25 cases where the cord prolapsed, and of these 25, twenty were footling presentations. In none was any attempt made to replace the cord. In all, manual extraction was done at once. Eight of these babies died. An examination into the causes shows that one had congenital syphilis; two were malformed; on one a craniotomy was done because of a contracted pelvis. In another case, death occurred where the patient came to the hospital after 3 days of indifferent labor, with the cord prolapsed and feebly pulsating. Immediate operation was of no avail. In another case, death was due to poor judgment. The patient was having poor pains, and she was given chloral. She slept during the night, and in the morning a non-pulsating cord was found in the vagina. Eliminating these 6 deaths, there are 2 cases left in which the loss of the baby was due directly to the prolapse of the cord. As prolapsed cord is regarded by Williams "one of the most frequent causes of fœtal deaths," it seems to me the results were most excellent; and the reason for such good results is because operation, manual extraction, was done at once.

An analysis of the length of labor of these

cases shows that there were 70 cases where the patients delivered themselves, in which the combined first and second stages was under twelve hours; while over twelve hours there were 41 cases. There were 99 cases where the first stage was twelve hours or more; and in 59 of these cases manual extraction followed, leaving 40 who delivered themselves; and of these 40 cases, in 31 the second stage was under one hour. The second stage was prolonged to two or more hours in but 24 cases; and 10 of these delivered themselves without aid, and 2 deaths resulted. Manual extraction was deemed necessary in the remaining 14 of these 24 cases, and 3 deaths followed.

These figures are instructive, but those in regard to the time of rupture of the membranes are the most striking and important. There were 95 cases where the membranes ruptured within two hours of full dilatation; and of these, 55 delivered themselves, and 4 deaths occurred. Manual extraction followed 40 times, and 6 deaths resulted. In marked contrast to these figures when the membranes ruptured close to full dilatation, are those when rupture took place early in labor or before labor started. There were 21 cases where the membranes had ruptured 12 hours or more before full dilatation. Only four of these patients delivered themselves, and in one of these the baby was still-born. Manual extraction was necessary in the remaining 17 cases, and in these 11 deaths occurred.

The mere length of labor is not the important point to be considered, for there were many long labors where delivery was successfully accomplished. The point that stands out clearly is, that when the membranes rupture early before the onset of labor, or more than 12 hours before full dilatation, manual extraction was very common, and the death of the baby was very probable.

In all of the 250 cases there were 46 deaths of babies. It is not, however, fair to include in the mortality list cases clearly not due to the breech presentation. The following 19 cases I have excluded: 7 malformations, 4 cases of antepartum bleeding, one each of hæmorrhage of the new-born, hæmorrhage from the umbilical stump, congenital syphilis and cerebrospinal meningitis, and 2 cases of contracted pelvis where a craniotomy had to be done. There were 2 cases in which death was due to the breech: but from the history it does not seem best to include them in the total deaths. The one was the patient I have already mentioned, who came to the hospital with cord prolapsed. The other had been looked after by a midwife and a physician for 3 days. She finally was sent into the hospital and it was found that the baby was dead, the breech was impacted at the brim, and above was a very tight constriction ring. She was finally delivered and made a good convalescence.

Eliminating these 19 cases, the deaths due directly to the presentation were 27; 19 were in primiparæ and 8 in multiparæ. A further analysis of these 27 cases shows, that in 11 cases the duration of labor was from 16 hours up to 2½ days. In all of these 11, the membranes had ruptured early, some 3 and 4 days before the onset of labor. The shortest time was 7½ hours before full dilatation. Of these 11, manual extraction was necessary in 9, only 2 patients delivering themselves. Six of these cases showed some marked alteration in the fœtal heart sounds before operation was undertaken. In 3 the fœtal heart was not watched carefully, and in 2 no alteration took place.

There were 6 cases where the patients delivered themselves unaided; and from the records it would seem that the fœtal heart was not watched as carefully as it should be.

Two deaths were due to prolapsed cords; one was in a primipara with a large 10½ pound baby; the other was a small baby in a primipara with an external conjugate of 17.5 cm. There were 3 cases of labor of short duration, where the breech was expelled without assistance and the cord then was found pulseless. Ether was given and extraction was at once done, but without avail.

There were 3 cases where the pelvis was contracted; and all were lost. In another the baby was manually extracted, the posterior arm was locked behind the occiput and the humerus was fractured. The baby did well until the fourteenth day when, after the examination of the fracture, it suddenly collapsed and died,— probably, the record states, of fat embolism. The final case, where the death

of the baby occurred, was brought into the hospital because her room was so small and filthy that operation there was deemed dangerous. The second stage, with ruptured membranes, was thereby prolonged to 4 hours. She was delivered at once upon arrival at the hospital, but the child lived only a few moments.

CONCLUSIONS

1. Breeches in primiparæ are common.

2. Manual extraction occurs in one-half of all breech deliveries.

3 Forceps to the after-coming head is at times a life-saving procedure.

4. Lacerations of the maternal soft parts occasionally are very extensive.

5. Injuries to the child are much more common than in vertex deliveries.

6. Sepsis is no more common in breech than in vertex deliveries.

7. Breech presentations in contracted pelves should have an early Cæsarean Section.

8. The fœtal heart in breech presentations should be listened to at short intervals after the rupture of the membranes.

9. If the cord prolapses, immediate extraction should be done.

10. A long labor, *per se*, is not an indication for operative interference.

11. Early rupture of the membranes, without advance in the labor, is an indication for immediate operative interference.

It is these last two conclusions upon which I wish to lay especial emphasis. A long labor where the advance is steady, with the membranes intact until a short time before full dilatation, is not an indication for operative interference. I have shown that the deaths in such cases are relatively few; but in marked contrast stand out the cases where the membranes rupture early or before labor starts. When a series of 21 cases with the membranes rupturing early in labor give a mortality of 12, then is it time to see wherein lies the error of our management of the cases.

We are advised in the text-books to leave breeches alone until a positive indication arises, and that indication is usually said to be an alteration in the fœtal heart. If we wait until this occurs, then we must of necessity operate on a baby with lowered vitality. It is not the manual extraction *per se* that kills, it is the fact that a hard operative delivery is done on an already partially asphyxiated baby. This series of cases, it seems to me, show that fact clearly; for in the prolapsed cord cases, where manual extraction was done at once, the results were exceptionally good; while where manual extraction was done late, after the membranes were long ruptured, the results were very bad.

It, therefore, seems fair from this series of cases to recast the indications for operative interference in breeches and not to wait until there is an alteration in the fœtal heart sounds, but to regard a non-advance or very slow advance of the labor, the positive indication for delivery.

DEPARTMENT OF TECHNIQUE

THE USE OF HARRINGTON'S SOLUTION IN THE TREATMENT OF SUPPURATIVE INFLAMMATIONS OF THE KNEE-JOINT

Report of an Illustrative Case

By J. E. SUMMERS, M. D., Omaha, Nebraska

It has been proven, experimentally and clinically, that Harrington's solution will kill all of the common germs met with in surgical practice in from twenty seconds up to one minute, and it does not kill the tissues, that is to say, it is not caustic. After thorough washing of the hands in hot soapsuds, and then immersing them for two minutes in Harrington's solution, if then cultures are taken there should be an entire absence of growths. Even when there is no preliminary washing of the hands before their immersion in the solution for two minutes, the results are remarkable. Harrington says: "I have repeatedly soaked my hands (without preliminary scrubbing) for two minutes, and then have had plantings made from material removed from about each nail and from scrapings of the skin of each finger, and from the palm. Occasionally, I got a growth, but as a rule, every tube of bouillon remained clear and sterile.

Now, first, if we have to deal with an infected wound, all of its surfaces permitting of being laid bare, so as to admit of the removal of the infective products and more or less destroyed tissues; second, if we have at hand a solution which will destroy the germs of infection, but not injuring the healthy tissues; and, if we, in addition, employ free drainage to the whole surface of the wound, the necessary result must be the changing of an infective, perhaps life-threatening, condition, to one representing a healthy process of repair.

Briefly in illustration, a Case. — A little boy, seven years of age, was brought to me, September 20, 1907, with the following history, furnished by his father: About August 15th, he had been struck upon the knee by a baseball; there was not much complaint at the time, but four or five days later he began to suffer severely, the joint began to swell and the child became very ill. The customary general and local treatment was employed. About September 6th, a physician made an incision into the joint, and evacuated much pus. Upon entrance into the hospital the child was in a serious state; he was thin, pale, expression anxious; his temperature was high and the pulse rate fast. The knee was flexed and there was a short incision on the inner side from which some pus was running; he was in mortal terror of being touched, and his condition was dangerous. Under ether, the knee was cleaned up and it was found that there was a large reservoir of pus in the upper part of the joint cavity, which the incision did not drain freely. The patella was loose in the joint — it was removed. An incision was made directly across into the joint, and the flexion increased to the limit so as to expose the interior freely. Considerable pus escaped, although the preliminary irrigation had appeared to remove all. In other words, the incision opened, as it should, not only the extensive synovial membrane freely, but also its pockets. With scissors and forceps much necrotic tissue was removed. Two high lateral incisions were added, so as to better drain the upper cavity of the joint, and the suprapatellar bursa, which freely connected with it. After thorough irrigation with hot normal salt solution, and dry sponging, the cavity of the joint was filled with Harrington's solution, and all exposed parts covered with gauze saturated with the solution. The gauze and solution were removed after four minutes, and all parts gently irrigated with sterile water, and dried. The wide open wound was packed tight with iodoform gauze. Heavy dressings were applied and bandages, so as to hold the leg in its forced flexed position.

Result. — The boy's general condition changed wonderfully. The pain disappeared, the pulse dropped, the temperature fell; he began to eat. For the first time the dressings were removed on tenth day; there *was no pus, not a drop*, in the joint; but it was filled with beautiful granulations. On the edges of the two high incisions, made to better drain the upper part of the joint, there was a little mild infection. The knee was straightened, and the wound repaired. The edges of the flaps were thick and the skin retracted so that nice, accurate co-aptation of the skin edge was impossible. The

second dressing was about one week later and showed absolutely no infection anywhere. The boy left the hospital after a stay of seven weeks; he walked around the ward two weeks before going home, wearing a posterior splint to prevent a tendency to flexion. The little fellow could flex the knee some, but could not extend it. I am hopeful that in time this will improve. Three days ago we learned that he was getting along nicely.

Harrington's solution acted in this case as I have never seen any other act in similar cases, although, of course, we recognize that the incision employed is the best for complete drainage of the knee joint, and drainage is the *sine qua non*.

Two weeks ago last Saturday I did a similar operation for a man suffering with chronic gonorrhœal inflammation of both knee joints. He had been under observation in the hospital for many months. Only one knee was operated upon. The dressing was first changed upon the thirteenth day, and the limb straightened. The wound was ideal in appearance, and I think the outlook good. I will report the case later.

My experience with Harrington's solution is not very great, but we use it in infective wounds where it is applicable. After thorough surgical cleansing of a wound or abscess cavity, the solution is allowed to remain in contact with all its surfaces for from two to five minutes; it is then irrigated or sponged away, and the particular wound dressed as required. Any one who will try Harrington's solution, as indicated, will like it. It has, besides its proven antiseptic property, the power, when applied to a raw surface, to produce a copious discharge of serum, thus aiding the washing away of obnoxious elements from a wound.

ARTHRODESIS AND TENDON TRANSFERENCE IN PARALYTIC CLUB FEET

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Synopsis — Paralytic club-foot a very prevalent disability. Recurrence of deformity slow, but certain, when ordinary methods only are used for correction. Great value of arthrodesis in improving strength and ability to support body-weight. Its value in flail ankle joints. Tendon transference a supplement to arthrodesis to restore muscular balance in member, and thus prevent return of deformity. Its wide range of application in cases hitherto considered hopeless. Early correction, fixation and proper balance desirable, that strength of muscles may be maintained and co-ordination restored by use, and valuable time thus saved. Better results in children than in adolescents, for several reasons; hence the plea for early operation. Arthrodesis in the younger cases still on trial. Author's personal experience: Satisfactory results in more than thirty cases without mishap.

Having been early in copying the work of the world's leading orthopedists in the treatment of paralytic club feet, your essayist has accumulated experience which may be of some value to those in the formative stage, or to those who do surgery of this character occasionally only, without having had any considerable orthopedic experience. No claim of originality is made, and due acknowledgment is extended to all who have followed Albert in doing arthrodesis, to improve the usefulness and sustaining power of paralyzed members, and to Nicoladini and others in tendon-grafting and tendon-transference, to appropriate to best advantage the remaining muscular power. Perhaps the greatest good to come from the rediscussion of subjects which are not original with a writer, is that it serves to disseminate our knowledge among our fellows and the great numbers of general practitioners who have the first observation of cases, and who are the court of first appeal, which frequently decides, for good or for ill, the course of the cases. Paralytic or acquired club feet is a most common deformity, and is attended with varying degrees of disability, and the majority of cases are amenable to a much larger measure of relief than is generally recognized, by either physicians, general surgeons, or even some orthopedists.

For many years the common practice was to correct the deformity in paralytic club foot, without any attempt to correct or overcome the tendency to return of the deformity, except by a brace, which is not only undesirable, but impracticable; because it is usually inefficient, or soon rendered so by wear, breakage, neglect, or the growth of the child. Return of the deformity was, of course, inevitable. The discouraging effects upon parents only served to resign them to the unfortunate condition. In general, the bad prognosis in these

conditions has served to pervade both lay and professional minds with a hopelessness that causes a large proportion to abandon treatment, or to seek the relief which a brace will afford, their advisers oftentimes having no conception that an operation might furnish a large measure of relief.

It is also unfortunate that so many years of lameness and disability are spent, to the detriment of the individual, in want of use, in favoring secondary deformity and lack of development. The early establishment of corrected conditions is most useful in securing growth, development, and the largest possible usefulness. The pernicious effects brought about by over-action of strong muscles, and the over-stretching of weak ones, serve to exaggerate the deformity, and, is indeed, solely responsible for it. The maintenance of a member in a normal position, by joint fixation, limits the action of the stronger muscles and protects the weaker, and the supplemental action of transferred muscular power serves to maintain a more balanced function. The early correction of the position, and the restored balance of muscular power, are desirable to hasten early use, and thus gain time, which is an important factor in the growth and development of weakened, though not wholly paralyzed muscles; and, if other muscles have been utilized, and their function transferred, their use and co-ordination should be established early, while the child has the adaptability peculiar to its age. A gain has thus been made which, in an older individual, would not be as fully realized. In some older cases there is disappointment, seemingly for no other reason than a lack of spirit. The older children and the adolescents who have not learned, or who have been deprived of walking, have a fear of falling, in their efforts to walk, which a young child does not possess, and, therefore, falls repeatedly without discouragement. These older children lose this "vis-a-tergo" if surgical relief comes too late. This applies to the extreme bilateral cases.

Tubby and Jones, in the preface to their admirable treatise on the Surgery of the Paralyses, say: "The newer procedure of muscle-grafting, tendon-transference, and arthrodesis, has widened the scope of surgical treatment, both of paralysis itself, and of its resulting deformities, and promise to effect an entire revolution in this branch of surgery."

In the very slight cases of toe-drop, the tibialis anticus, transferred to the common extensors, will do much to overcome the lack of action in the disabled extensors. This is both the simplest and the most common procedure. In cases of total loss of the whole anterior extensor group, from early paralysis, and where no brace has been worn, and a severe talipes equino varus has been produced in a child of some years, it will then be necessary to do much more — perhaps the complete removal of the astragalus, and the removal of the joint surfaces from the calcaneo-cuboid articulation, and the appropriation of the tibialis anticus for the extensors. In very extreme cases of varus, the tibialis anticus is secured to the periosteum, on the outer surface of the cuboid, and the tendon of the flexor longus hallucis, brought through the interosseous membrane, and attached to the common extensors. The operation most frequently required is the production of an artificial ankylosis of the tibio-astragaloid, astragaloscaphoid, and the calcaneo-cuboid articulations, with such transfer of muscle power as available and necessary to overcome the tendency to return of deformity, and to lift the toes sufficiently to prevent dragging.

In bad cases of deformity, usually an evidence of extensive loss of muscle power, arthrodesis is positively indicated to fix the position that the foot may easily be maintained at a right angle. This serves to prevent the over-stretching of weak muscles, so destructive to their usefulness, and any appropriated muscles used do not suffer an immediate handicap; and even though their action may be relatively feeble, yet it may be enough to maintain fair function, balance muscular action, and maintain the position. Less often is it necessary to provide against loss of the posterior muscles of the leg. Calcaneus is a relatively rare form of deformity. It is caused by the loss of the strong calf muscles, and if this is the sole disability, our task is greater in securing muscular balance than if part only of the anterior group are paralyzed. The posterior tibial, peroneals, plantaris, and flexor longus hallucis have been used singly, or in various combinations, to meet the indications. And, if anterior muscles only are available, the tibialis anticus, extensor proprius hallucis, or a slip from the extensor longus digitorum may be appropriated to such an extent as to get a balanced action. A stiff ankle may be necessary to a more secure and complete result, and the displacement of the foot backwards, according to Whitman, is so valuable a measure that it should always be used. The degree of ankylosis (which is difficult to predict) should vary to suit the needs of the various cases. We should secure complete ankylosis in flail joints. In general, partial ankylosis only, in proportion to the amount of deformity, and the tendency thereto.

Wolenberg calls attention to the ill consequences of nerve division in muscle-splitting, and cautions

against severing the transverse nerve communications, which is likely, if the muscle is split above its middle.

Lorenz believes that it is time for a reaction in tendon-grafting; he having met with cases where it had been overdone, with results worse than before. There is undoubtedly this danger, and causes us to pause and give heed to the conservative words of Tubby, in his Hunterian Oration last year, wherein he states that he feels in attacking paralytic affections, either by tendon-grafting, muscle-transplantation, or nerve anastomosis, that we are confronted by a most intricate problem; but early results, following operative treatment, considering the comparative failure of all the preceding measures, seem to justify a very careful and well-considered trial in suitable cases.

At the Nebraska Orthopedic Hospital, since its opening in October, 1905, the writer has operated sixteen patients, representing twenty-one paralytic club feet, by arthrodesis and muscle-transference. The ages were from five to twenty-one years. In private practice, an almost equal number has been so treated, in a period somewhat longer. In no case was suppuration a factor. Drainage was always used, in the form of gauze, rubber tissue, or combined in the form of a cigarette, that blood, serum, or synovia might find ready egress. This was gradually removed at each daily dressing, until all drainage was dispensed with, within a week. The discharge of synovia would sometimes continue for from three to six weeks. One gave a slight discharge for three months. All closed without evidence of suppuration. In nine cases of extreme deformity, astragalectomy was done in addition to the arthrodesis and tendon-transference, and these represent some of the most pronounced improvements, in which crutches and braces have been discarded.

The writer being a surgeon, and a constant user of catgut, this material has practically superseded silk, which was early used in imitation of the orthopedist. The silk, I believe to be only necessary in tendon-lengthening, according to Lange, and to those cases where the tendon is united to bone, or periosteum, under tension, as in the transfer of the tibialis anticus to the outer border of the foot, and attached to the cuboid. Fine strong silk, boiled in sublimate, dried, and reboiled in paraffine (melting point 55 degrees) immediately before operation, as recommended by Lange, is an elegant suture, easily handled and free from the larger knots of the finest catgut suture, which must be admitted by all to be objectionable in the delicate work necessary, especially in young subjects. The skin was, at the first, united by silk, later horse-hair, and now, by plain catgut. The latter, used in the form of a continuous suture, is preferred.

Very heavy plaster casts have been applied, to permit of large openings for dressings and inspection. Swelling at the fenestra should be controlled by compresses and snug bandaging. The first casts usually remained on for six weeks, when they were renewed for cosmetic reasons. Light weight bearing was allowed after two months; slight use in walking in three months, and increased or diminished according to their ability to use, without pain, or evidence of arthritis. The patient should not be encouraged to use the foot, if any considerable pain is produced. Usually no pain or disability from arthritis persisted after four to six months.

This prolonged maintenance of the feet, in the corrected position, has worked wonders in producing a more normal shape to the feet, and with a fixed position there was opportunity for a more normal action of the sound muscles; and the weak ones were given a chance, they being aided by the transferred muscles, whose power has been subtracted from the strong group, and added to the weaker, thus equalizing the power, balance and function, and thus lessening and perhaps preventing recurrence.

It can be fairly stated that every case has been benefited in every way. The improvement has been somewhat commensurate with the strength and value of the material to be utilized in the restoration. Most of the cases are too recent for an ultimate estimate. Results promise well, however, and in general are among the most satisfactory in this class of surgical endeavor.

As a rule, arthrodesis is not recommended by experienced orthopedists in subjects under nine years; the best and most permanent results, from this part of the combined procedure under discussion, are in subjects above that age. The writer, however, felt impelled to treat his young subjects the same as the older ones, believing that the arthrodesis might better be repeated later, if necessary, to re-stiffen the joints, than to deprive them of its unquestioned benefits. This course has seemed justified in the poor cases in which the period of treatment and observation was limited, and braces were not available nor practicable, for a long period. Another explanation also is that the operative surgeon is more impatient for results, and is quicker to do definite things, than the exclusive orthopedist, who seems to have been educated in a school for patience and is willing to wait longer for results. We are, therefore, reminded of the lines of Pope:

"Avoid extremes, and shun the fault of such,
Who still are pleas'd too little or too much."

Conclusions: 1. Arthrodesis after resulting ankylosis, holds the ankle stiff and immobile. The increase of mobility in the anterior articulations of the foot will compensate for the loss of motion in the large articulations of the tarsus. The foot is thus permanently maintained in a right angle position. 2. If all of the muscles of the leg are paralyzed, resulting in a flail joint, the production of a stiff ankle and tarsus is the only practicable procedure, if a foot and ankle are to be made to sustain the body-weight. 3. Tendon transference, in addition to arthrodesis, appropriating to best advantage the remaining muscles, enables us to secure the best possible results. 4. Patients should have the benefit of such treatment as soon as the extent of the paralysis is determined. 5. Great advancement has taken place in this branch of surgery.

The profession generally is not fully apprised of this advance: attention to this subject, therefore, it is hoped, will serve to increase interest in this class of work. The improved prognosis will doubtless result in lessened deformities, increased usefulness, and a more hopeful outlook for those too frequently regarded as hopeless cripples, because the cause is paralysis, the latter idea being too thoroughly ingrafted into both the lay and professional minds.

CYST OF THE PANCREAS, WITH REPORT OF AN OPERATION AND EXHIBITION OF THE SPECIMEN

By RUFUS B. HALL, M. D., Cincinnati, Ohio

In the literature, cysts of the pancreas are described as true cysts and pseudo-cysts.

It is necessary, in discussing this subject, to recall the facts that a true cyst of the pancreas is a sacculated accumulation of fluid originating in the pancreas and retaining an anatomical connection with the organ. And a pseudo-cyst is an accumulation of fluid in the lesser peritoneal cavity about the pancreas. It is evident that the treatment of the two conditions could not always be carried out with the same surgical technique. True cysts of the pancreas are retro-peritoneal tumors; pseudo-cysts are intra-peritoneal accumulations of fluid. The cause and the mode of development of true cysts are somewhat in doubt. While there may be cases of dilatation of the duct by obstruction from calculi, it would be difficult to prove the exact cause except upon autopsy. That inflammation or traumatism play an important rôle in the production of true cysts, there can be but little doubt.

Judging from the literature, one would be inclined to believe that the tail of the pancreas is the favorite anatomical location for the development of these cysts. In the inflammatory process, effusion takes place into the glandular tissue of the organ, which results in degenerative changes, leading to the formation of an adventitious wall of an inflammatory material plus the artified pancreatic tissue, thus forming the true sac into which hemorrhages repeatedly occur. Such tumors are distinguished by their dark color and hemorrhagic contents and anatomical connection with the organ. The contents of pancreatic cysts are varied; but usually the fluid is of a brownish red or dark green. They are alculine in reaction, and contain albumen, fat globules, crystals of cholesterine, white and red corpuscles.

The fluid from the cysts quickly excites irritation. The size of pancreatic cysts varies from a small vesicle to an immense sac containing three or four gallons. The diagnosis of pancreatic cysts should be based upon the character of the contents of the tumor rather than upon the supposed demonstration of anatomical connection. The mere finding of the remains of the pancreas by the examining finger from within the abdomen is not positive proof that the sac is of pancreatic origin. It is a well-recognized fact that tumors within the abdomen often misplace neighboring organs or become attached to them, thus misleading the surgeon in his judgment. But if the contents of a cyst demonstrates the presence of pancreatic fluid, and the anatomical relations are those of a pancreatic cyst, little doubt should remain as to its true nature. These cysts, if they develop to any great size, may displace neighboring organs.

Salzer refers to one instance in which the cyst developed behind the abdominal aorta and vena cava, pushing these vessels forward towards the abdominal wall. In the author's case, fortunately those important structures were behind the cyst, yet they were firmly attached to it. The cyst wall

is prone to undergo degenerate changes from pressure necrosis, premitting the escape of its contents into the peritoneal cavity, or by fistulous communication into the alimentary canal.

In a large per cent of the cases, there is a history more or less definite of an abdominal injury. In many cases, the enlargement is observed soon after the injury; in others, years have elapsed. In other instances, the development of the cyst follows some acute disease, like typhoid fever, attacks of colic, or intestinal disturbances. While in a large majority, the course of pancreatic cysts is comparatively acute, a few weeks covering the entire history, but there are many instances on record in which the cyst has been known to be present for years without causing much inconvenience until some accidental hemorrhage, or rupture of the sac, or the pressure causing intestinal obstruction, brings the case to a sudden termination.

The subject of this report is Mrs. G. W. S., of Mason, Ohio, age forty-two years; mother of eleven children.

In November, 1897, she was delivered by Dr. Claton Hall, of Mason, Ohio. He discovered at that time that she had an abdominal tumor about the size of an ordinary cocoanut, which was not tender upon pressure. She was a strong and vigorous woman, a farmer's wife, had never needed the services of a physician excepting at confinement, which had always been normal, like the one at this time. The doctor only discovered the tumor in delivering the placenta. He regarded it as ovarian, but he could not explain why it was not movable. It remained above the uterus after her delivery. He advised her and her husband to have the tumor removed as soon as she was convalescent, but in the place of having a normal convalescence, as she had been accustomed to having at her previous confinements, within a day or two she developed fever. Her temperature ran from 100 to 102 for three or four weeks, and she was not able to leave her bed for four weeks after her delivery; but within two or three weeks after this time, she was in her normal condition, and felt so well and so little convinced from the presence of the tumor that she declined an operation for its removal.

Dr. Hall conferred with the writer two or three times about the management of the case during her illness. Within two years after this delivery, she gave birth to another child, with almost exactly the same clinical history following it; that is, fever came on in two or three days and continued three or four weeks. There was no indication that there was any infection in the uterus. There was no unusual discharge, but the abdomen was largely distended by gas. The patient was again advised to have the tumor removed, and said she would do so as soon as she recovered. At the end of four or five weeks she was again able to leave her room, and within a month or so was apparently perfectly well, excepting the presence of the tumor.

During the period from November, 1897, to January, 1906, she bore four children, and had two premature births at about four and a half months. Each one of the living children was followed by the same acute illness following delivery described above. In both premature labors she missed having any complications following delivery. The tumor steadily enlarged from the time it was first observed until her last delivery, on August 10, 1906, at which time the tumor appeared to be about once and a half the size of an adult head. In the first three deliveries she was attended by Dr. Hall. After his death, Dr. D. B. Hamilton, of Mason, Ohio, was her physician and referred the patient to me. The last delivery was followed within twenty-four hours by a severe pain in the region of the tumor and temperature reaching to 102 and 103. This illness continued with fluctuating temperature, and she and her husband believed that it would disappear like the preceding attacks, and declined to have an operation made. At the time of her delivery, her estimated weight was one hundred and eighty pounds, which was her usual weight for several years. She grew steadily worse, and within a couple of weeks after her delivery, she commenced to have chills at irregular times, followed by high temperature and sweats, and diarrhea. She would not consent to the operation and did not consent to one until January 8, 1907. She had been confined to her bed since her delivery on August 10, 1906. She was brought to the hospital on a stretcher, January 8, 1907. Her estimated weight was seventy-five or eighty pounds; her pulse rate was 136 to 150, and her temperature varied from normal and subnormal to 105 and 106. She had irregular chills, one or more every twenty-four hours, followed by profuse perspiration and almost collapse. She was very sallow and pale, apparently almost bloodless. She had been unable to take any food, excepting liquids, for several weeks, and she could not retain the liquids only when her temperature was down below 100. She vomited frequently at other times. There would be an interval of three or four hours each twenty-four, when she would take liquid nourishment.

During the time of the high temperature, she was listless, incoherent, and dazed. Her condition

was so very desperate that it looked like she would die within twenty-four hours at any time up to the time of her operation, which was made January 23, 1907. There were present and assisting, Dr. Joseph A. Hall, Dr. L. S. Colter, of Cincinnati, and Dr. D. B. Hamilton, of Mason, Ohio.

When she entered the hospital, examination revealed a tumor in her abdomen apparently the size of a seven-months gestation. It was dull over the whole front of the abdomen; it extended from the pubic arch to four inches above the umbilicus; both flanks were resonant. Vaginal examinations revealed that the uterus was retroverted, and the tumor did not occupy the pelvis. Fluctuation was distinct over the entire tumor. It was evident the cause of her sepsis was in the tumor itself. What the pathology was, was not so clear, but the opinion of the writer was that if any operation was made to relieve the patient, the tumor would be in such a pathological state that simple draining would not relieve her; that we must be ready to take the tumor out if we gave her any chance to recover. At this stage, I believed that the tumor was ovarian, and that she had infection in the tumor from some cause.

When the operation was made, the incision was made four inches long, commencing an inch below the unbilicus and extending downwards. I found what I hoped to find, that the entire tumor was adherent to the abdominal wall, without making any attempt to separate it more than to be convinced of this fact. The cyst wall was a dark chocolate color, looking almost the color of liver tissue. It was tapped with a large size Tait trocar, and about a gallon and a half of fluid of a dark chocolate color evacuated, which had a foul, smelling odor, similar to that of an iscio-rectal abscess. I believe the infection of the contents of the cyst was conveyed by the intestinal tract. Upon examination of the fluid, it was alkaline in reaction, and contained pus, crystals of cholesterine, blood corpuscles and fat globules, and a great amount of debris. I am convinced that there was an effort on the part of nature to establish a communication with the intestinal tract, and thus empty the contents of the cyst in that manner.

After the cyst was emptied, it contracted greatly. The adhesions to the abdominal wall were separated, and it was at once determined that it was in no way connected with the uterus or ovaries. They were perfectly normal, and were not adherent to the tumor. By sticking close to the tumor itself, we could enucleate it without great difficulty at the first part of the operation. The greatest difficulty appeared to be breaking through the tumor wall and fouling the field of operation, which was done on several occasions. The cyst wall varied greatly in thickness. As you will observe, it is about five eighths of an inch thick, excepting in numerous points there are places about the size of a quarter of a dollar that are very much thinner than the adjacent part. All of these thin places were very much more friable than elsewhere. It was in these thin parts that we easily tore through the wall of the sac in enucleating it. The bleeding was not very severe until we approached the back part of the tumor in the upper half of the abdomen. Here we separated some vessels that caused us considerable anxiety for a short time. We were able to soon control the bleeding and enucleate the tumor, which was attached well up towards the left costal cartilage. The pedicle was as thick as the finger. After ligation, in place of dividing it with the scissors, I was able to pinch it off with my fingers, showing the friability of the cyst wall. It was found after we had enucleated the tumor that the colon, as well as the small intestines, were in front, and that the tumor had been enucleated from the post-peritoneal cavity.

The patient suffered a profound shock and rallied very slowly. Convalescence was not established until the fourth day. She had a tedious and protracted convalescence. The sinus did not close for five weeks after the operation. The patient left the hospital six weeks after the operation convalescent, but quite feeble. She continued to improve, and after three or four months she had regained her usual health, and is now enjoying most excellent health.

The anatomical location of the tumor, its relation to the surrounding organs, and the character of its contents can leave no possible doubt that we had to deal with the true cyst of the pancreas, due to some obstruction of the duct in that organ. The case is unusual in having a long history of a well-defined tumor with comparatively little inconvenience, excepting following her confinements. Whether or not those attacks were due to some local inflammation about the capsule of the tumor, or some infection about the uterus, it is uncertain. But judging from her last attack coming on immediately after confinement, simulating the other attacks, one would be inclined to the opinion that the former attacks of pain and fever were due to inflammation about the cyst wall. The last attack probably commenced, as the former attacks, as inflammation of the cyst wall, but later in the progress of this attack, infection of the contents of the tumor was conveyed by the intestinal tract, and this infection was the cause of her sepsis.

A CASE OF FATTY DEGENERATION OF THE KIDNEY

REPORTED BY ROBERT T. MORRIS, M. D., NEW YORK
Professor of Surgery in the New York Post-Graduate Medical School and Hospital.

Mrs. M. B., 54 years of age, was admitted to the Post-Graduate Hospital in New York on May 29, 1907. Referred to my service by Dr. R. T. Irvine of Ossining.

A hæmaturia appeared seven years ago, and was at first accompanied by no symptoms which would give a clue to its origin. It lasted "for a few days." Every year since then, she has had hæmaturia for a few days at a time. Three years ago, she began to have pain ranging from the left hip to the back; and of late an extremely painful disturbance appeared in the left iliac region. It was spasmodic in character, and was believed to be a manifestation of the passage of gravel. Two months before the patient's entrance to the hospital, there was a marked increase in the amount of blood in the urine; and the spasms were accompanied by nausea and vomiting. There was frequent micturition, anorexia, loss of flesh; and sleep was constantly disturbed by the pain in the left iliac region. On palpation the left kidney was found to be much enlarged, and distinctly painful on pressure. A radiograph showed the kidney to be enlarged about one-third more than normal, but there was no shadow indicating the presence of a calculus. Urine acid, yellow, specific gravity 1010. Albumen present, with much pus. Few epithelial cells. No casts, crystals, or sugar. The ureteral catheter was not used, as there was no doubt about the site of the morbid process, and it was feared that the employment of the catheter might be meddlesome.

Diagnosis: Neoplasm of left kidney.

Two days after the patient's entrance to the hospital, I exposed the kidney by a transverse, extraperitoneal incision in the left lumbar region. On making a longitudinal incision along the convex aspect of the kidney, a mass of fat emerged suddenly. The kidney was removed. The drawing made some months later (Fig. 1) does not represent the loose mass of fat well, as it had shrunken considerably in the preservative fluid, and a portion had been removed for microscopical examination; but the cut shows the proportion of parenchyma that had degenerated into a fatty mass. The larger part of the remaining parenchyma was yellowish and fatty. A microscopical section of parenchyma, made by Dr. H. T. Brooks, showed the presence of chronic interstitial nephritis. Fig. 2 is drawn from a photomicrograph of the fatty mass which occupied the pelvis of the kidney, and part of the area which should have been parenchyma.

The patient made a good recovery.

Fig. 1. Fatty kidney. Drawings by A. J. Martin.

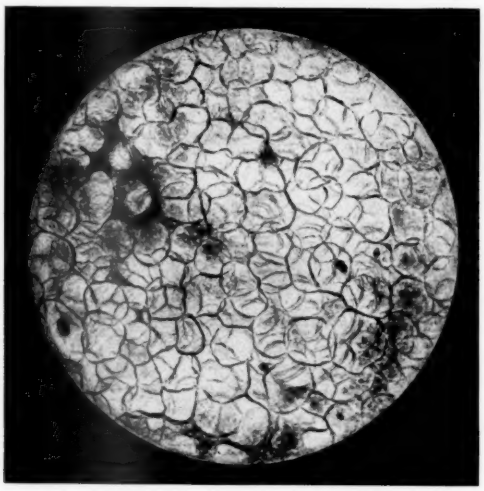


Fig. 2. Photomicrograph of kidney tissue.

THE ABDOMINAL INCISION[1]

By CLIFFORD U. COLLINS, M. D., Peoria, Illinois

Three muscles on each side of the abdominal wall pull on an aponeurosis in the central portion, which meets the aponeurosis of the other side at a line running through the center from top to bottom — the linea alba.

The external oblique pulls obliquely upward from above, the internal oblique pulls obliquely downward in the upper abdomen, and transversely in the central and lower abdomen, and the transversalis pulls transversely, as its name indicates. The combined pull of these muscles is from the linea alba. W. J. Mayo's transverse closure of an umbilical hernia is in accordance with this fact, and its success proves the truth of the principle involved.

One muscle on each side of the linea alba pulls straight up and down, parallel with it. The recti muscles are firmly enclosed in a sheath, formed by the aponeuroses of the three side muscles, except in the lower fourth where the posterior layer of the sheath is practically absent. The recti muscles are not adherent at any point to the posterior layer of the sheath. They are closely adherent to the anterior layer of the sheath at points called the lineæ transversæ. There are usually three of these transverse lines, one opposite the umbilicus, one between the umbilicus and the ensiform cartilage, and one at the level of the ensiform cartilage. As these lines correspond to certain ribs there may, occasionally, be more of them.

There are only four blood vessels of any consequence in the abdominal wall, the two superior epigastric and the two deep epigastric. These vessels run between and parallel with the fibers of the recti muscles.

The lower six intercostal nerves on each side run in the general direction of the corresponding rib, between the internal oblique and transversalis muscles, until they reach the outer edge of the rectus, the linea semi-lunaris, which they cross at practically a right angle, and penetrate the sheath. The location of these nerves was accurately pointed out by Blair (Surg. Gyn. & Obst., Aug., 1905), and they should be kept in mind and not be cut.

Madelung, in 1905, wrote on the "Post-Operative Prolapse of the Abdominal Viscera." (Verhandl. d. deutsch. Gesellsch. f. Chir. Berl., 1905, xxxiv. 2. Teil, 168-222.) He had collected 144 cases from the literature, six from personal communication, and added seven from his own practice. From these cases it was shown that the abdominal incision had bursted open at almost any time up to and including seventeen days after laparotomy. This has happened to both sexes, to patients of every age, and after all sorts of abdominal conditions, and even after exploratory incisions, where nothing was found. It is reported as far back as 1844, and occurs at the present time, with all our boasted excellence of technique. Low incisions have been most productive of this kind of trouble, and median rather than lateral incisions have conduced to it. The critical time is shown by his statistics to be the eighth or ninth day. Absorbable sutures have not been responsible, because it has occurred after the use of every kind of suture material, and after every form of closure. Coughing seems to be the particular factor which immediately brings it about. A generally depleted patient is, of course, more apt to have this sort of trouble, although it has happened when there was no visible evidence of interference with healing.

I have four cases to report of separation of the incision a few days after the operation.

Case 1. The patient had fibroids of the uterus with hemorrhages. She had flowed profusely for three weeks prior to the operation and had the pale, lemon-yellow color of anæmia. She was also very fleshy. A hysterectomy was done and the incision closed in layers, with continuous sutures of catgut. On the seventh day the nurse reported that the incision had separated. There seemed to have been no attempt toward healing on account of the bloodless condition of the tissues. The omentum had been drawn down over the intestines, beneath the incision, just before the abdomen was closed. This was fortunate, as the omentum kept the intestines from protruding out of the incision. The patient was taken to the operating room, and anæsthetized with ether, and the abdomen closed again with interrupted silkworm sutures, passed through all the layers. The aponeurotic layer was sutured edge to edge, with interrupted sutures of catgut. A drain was place at the lower angle of the incision. Her further convalescence was uneventful.

Case 2. The patient had a large fibroid of the uterus, with hemorrhages, the last hemorrhage being very severe and occurring just two weeks before the operation. Therefore she was very anæmic. A hysterectomy was done, and each layer of the incision was closed with continuous catgut sutures, reinforced by four interrupted Figure 8 silkworm gut sutures. She developed a cough after the operation, and the incision separated the entire length, in spite of the silkworm gut sutures. The tissues around the incision lacked vitality on account of the anæmia, and the sutures pulled right through them. On account of the bronchitis which caused the cough, I did not want to administer ether again, so the bowels were kept in with a

[1] Read at meeting of the Western Surgical and Gynecological Association in December, 1907.

packing of gauze and the edges of the incision were drawn together with adhesive plaster. It healed slowly and she now has a large ventral hernia.

CASE 3. This patient had a large cyst adenoma of the right ovary, and multiple fibroids of the uterus. The ovary and uterus were removed. She was very fleshy. The incision was closed with continuous sutures of catgut for each layer. On the seventh day she made a sudden movement in bed and felt something give. Examination showed that the incision had separated. The intestines were held in by the omentum, which had been drawn down over them, before the abdomen was closed. She was taken to the operating-room and ether administered. The incision was closed with interrupted Figure 8 sutures of silkworm gut, the lower loop of the eight taking in aponeurosis, muscle, and peritoneum. A cigaret drain was placed in the lower angle of the incision. The healing process then went on without interruption.

CASE 4. This patient had a carcinoma of the stomach, and was emaciated and poorly nourished. The incision showed that the glands were involved, and the growth could not be removed successfully, so a gastro-enterostomy was quickly done with a Murphy button. Each layer of the incision was closed with a continuous suture of catgut, reinforced with interrupted Figure 8 silkworm gut sutures. In a few days he developed a cough. On the thirteenth day the silkworm gut sutures were removed. On the fifteenth day the nurse reported that the incision had separated. The edges of the incision were friable and there had been little or no attempt at repair. I was away on a vacation, so one of my assistants took him to the operating-room, where the incision was closed. He died ten days later as a result of the carcinoma.

All of these incisions were longitudinal, and continuous through the recti muscles.

According to Madelung's findings, "those who believe that the use of a certain material, or of a certain form of suture, will successfully prevent the occurrence of post-operative hernia are in error." Then, it seems to me, the prevention must lie in better methods of making the incision.

In making the abdominal incision, two things are to be considered: First, the incision should be so placed as to give easy access to the pathology; second, it should permit of firm closure under conditions that will prevent a hernia.

Incisions should be placed so as to avoid cutting any of the intercostal nerves. It is a great deal more essential to avoid cutting the intercostal nerves than the blood vessels. The only two blood vessels of consequence are the deep epigastric and the superior epigastric arteries. The anastomosis of each is so plentiful that the tying of either vessel does not matter much, although it should be avoided when possible. But the cutting of an intercostal nerve may cause atrophy of the muscular structures it supplies, and thus cause a weakening of the abdominal wall.

The incision should be made through both aponeurosis and muscle, for two reasons. First, the muscle lends additional strength to the abdominal wall at the site of the incision, and second,

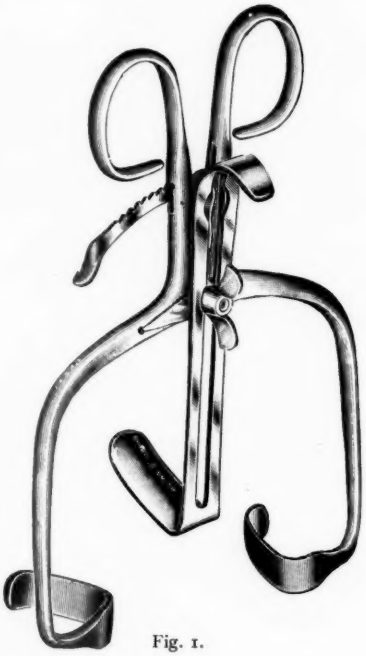


Fig. 1.

the muscle may be split and not cut, and in this way important structures, as nerves and blood-vessels, which lie in the plane of the muscles, will not be injured. An incision in the semi-lunar line, for instance, which is composed entirely of aponeurosis, with no muscle beneath it, must be cut all the way through, and, therefore, the intercostal nerves, crossing it in the line of the incision, must be cut.

An incision should not be continuous through all the planes of the abdominal wall at the same points. If a longitudinal incision is made in the median line, it is better to complete the incision through a rectus muscle on one side, instead of going on directly through in the linea alba. It is better still, if the incisions through the aponeurotic and muscular planes can be made in different directions, as in the McBurney incision.

The incision should be closed, in all cases, where possible. If drainage is necessary, it should be done through a small stab wound, in which the muscular and aponeurotic structures are split, and not cut, to one side of the incision, and not through the incision. In making an incision for the simple drainage of an abscess, the muscular and aponeurotic structures should be split, and not cut.

The best incision for the pelvis is Pfannenstiel's. The incision is made transversely through skin, fat, aponeurosis of the external oblique, and external sheath of the recti muscles, about one inch above the pubes. The internal oblique is split transversely, in the direction of its fibers. Then the recti muscles are separated in the median line, or either one is split longitudinally. No blood-vessels, or nerves of any importance, are encountered. The openings in the aponeurotic and muscular structures run in different directions, almost at right angles with each other, and thus practically insure the prevention of a ventral hernia. It has all the advantages of a McBurney incision for the pelvis. It permits of a very strong closure, the entire aponeurotic opening being underlaid with solid muscle, except at one small point, where the openings cross, and the opening in the muscle layer, being overlaid with a solid heavy aponeurosis, except at the same small point. The action of the recti muscles tends to pull the edges of the aponeurotic opening closer together. It gives ready access to the pelvis and plenty of room for any pelvic work.

The incision through the skin usually falls below the pubic hair line. When the hair grows out the scar is concealed. Particularly is this true when the patient is a brunette, with a plentiful supply of pubic hair. I have patients that no one can tell that they have undergone a pelvic operation through the abdominal wall. Patients will often consent to an operation through the vagina, but will object to an operation through the abdomen, on account of the resulting scar. This is particularly true of young females. If the scar is concealed, this objection will be removed.

I submit a modification of the Mayo-Simpson retractor, especially designed for use in the Pfannenstiel incision, although the third arm has proved useful in the ordinary longitudinal incision, in holding back the lap pads, and preventing the retractor from swinging around to either side. (See Fig. 1.)

I have now used the Pfannenstiel incision in one hundred and twelve operations. The first thirty were done with the cosmetic effect in view, and the transverse incision was made through the skin and fat, with a longitudinal incision through the aponeurosis and muscle. Then the strength of the closure, when the aponeurotic and muscular openings were made at right angles to each other, appealed to me, and I began to make the transverse incision through the aponeurosis also. The fact that the appendix was removed in ninety-six of these operations, through this incision, shows that it gives plenty of room to work through. In

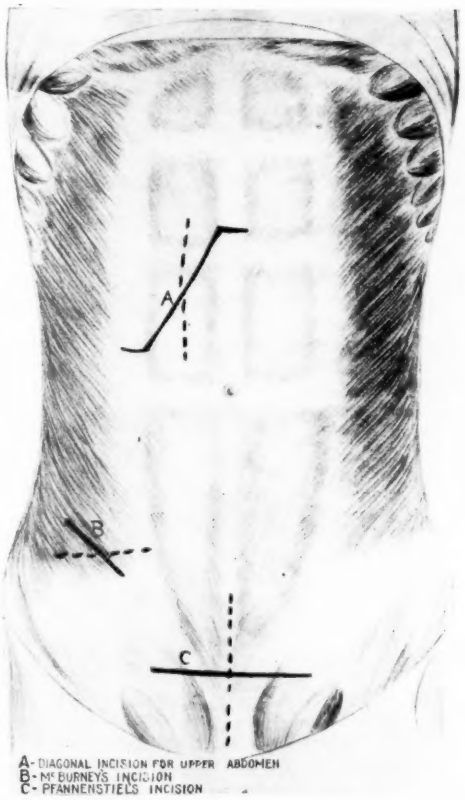


Fig. 2.

three of the operations, in which the appendix lay up behind the cæcum, it was necessary to make an additional McBurney incision in order to remove it. In these three operations, the appendix could not have been removed through the usual median longitudinal incision. In the one hundred and twelve operations, through this incision, every variety of pelvic work was done, including nineteen hysterectomies, some of which were for fibroids of the uterus. Some of the patients were very fleshy, so fat is no bar to the incision. The gall bladder can be felt and examined through it. Some of the operations were for pelvic inflammation, in which pus was found, and the incision became infected, but, so far as I know, there have been no cases of ventral hernia. In a recent case, the patient developed a severe cough immediately following the operation, but the incision did not separate. This incision can be placed a little higher for access to the central lower abdomen.

For the outer part of the lower abdomen, McBurney's incision is usually the best. The aponeurosis of the external oblique and the internal oblique and transversalis muscles are split, thus avoiding the cutting of any nerves or blood-vessels, and the openings through the aponeurotic and muscular structures are not in the same direction. If additional room is required, the split in the aponeurosis of the external oblique could be extended some distance in either direction. The opening in the internal oblique and transversalis muscles can be extended by cutting transversely across the semi-lunar line, and extended still farther into the sheaths of the rectus, by retracting the rectus toward the median line.

The ideal incision for the upper abdomen would be transversely through the skin, fat and aponeurotic structures (anterior and posterior sheaths of the recti muscles), with a longitudinal separating or splitting of the recti muscles. This gives a very firm closure, but does not give the access to the pathology that Pfannenstiel's incision does, for the pelvis and lower abdomen. I did a gastro-enterostomy through an incision made in this way, and the patient could have arisen and walked at once so far as any pull on the edges of the incision were concerned, and in this particular case, the operation was accomplished without much difficulty but it was a favorable case, and it was seen that the incision did not give much room in which to work. In the upper abdomen, the recti muscles are enclosed, both anteriorly and posteriorly, in a firm aponeurotic sheath that does not permit them to be retracted very far to either side when the sheath is incised transversely. In the lower fourth, the posterior sheath is absent, which leaves them free to be widely retracted.

But a diagonal incision from the inner edge of the rectus, down to the outer edge in the direction of the fibers of the internal oblique, through both anterior and posterior sheaths, permits of better retraction and gives better access to that region. A transverse cut across the linea alba, at the upper angle of the incision, and a similar one across the linea semi-lunaris at the lower angle, gives still more room in which to work. (See Fig. 2.) The rectus should be freed from the anterior sheath. This can be readily done by blunt dissection, except when a linea transversæ is encountered. In that case, the dissection must be carefully done with scissors, or a knife. It is very easy to cut across the rectus muscle at a linea transversa. The rectus is not adherent to its posterior sheath, and the separation is easy. The rectus may be split, or the entire muscle retracted to the outer side. If the muscle is completely mobilized, as it should be, it is usually easy to retract it entirely out of the way to the outer side of the incision. I have done gastro-enterostomies and gall-bladder work through this diagonal incision over the right rectus muscle, with the transverse extension at either end. So far, this has been sufficient to give enough room to work in, but, if the occasion demanded, a similar diagonal incision could be made over the left rectus, connected by the short transverse incision across the linea alba, and a very wide opening made which would give access to the entire upper abdomen. This has been done on the cadaver, but I have not found it necessary, so far, in operative work. In this incision, the openings through the aponeurosis and rectus muscle (if there be an opening made in the muscle) run in different directions. The incision in the aponeurosis runs in the general direction of the fibers of the middle side muscle, the internal oblique, and not at right angles to the general pull of the side muscles, as does a longitudinal incision through the linea alba, or the sheaths of the rectus. It does not cut any intercostal nerves.

Conclusion. 1. Abdominal incisions should be placed so they will pass through both aponeurosis and muscle.

2. The incision in the aponeurosis, and the split in the muscle, should run in different directions. This can be done in a large majority of abdominal operations.

3. A longitudinal incision should not be made through the linea alba or the sheaths of the rectus, at a right angle to the combined pull of the three side muscles, when it is possible to avoid it.

4. For very large tumors, and cases where the character and location of the pathology is in doubt, the longitudinal incision is probably necessary.

5. If the longitudinal incision is necessary, the split in the rectus should not be continuous with the aponeurotic incision, but should be placed to one side, and, preferably, through its inner half, to avoid the intercostal nerves which enter the outer half.

6. It will take longer time and more experience to demonstrate the correctness of these conclusions.

AN UNUSUAL OBSTETRIC COMPLICATION, CAUSING THE REMOVAL OF 126 INCHES OF SMALL INTESTINE

By H. J. DONALDSON, Williamsport, Pa.

The patient who presents the following history I saw, in consultation with Doctors Wilson and Burroughs, of Cross Fork, Pa.

She was delivered of a male child after a labor of eighteen hours, and an occipito-posterior presentation.

The labor passed off without any undue trouble until the final delivery, during the third stage, when the patient suddenly exhibited symptoms of shock, at which time she was given chloroform and forceps delivery made.

After delivery of baby, which occasioned a perineal tear, the placenta was delivered easily, but with it, much to the consternation of the obstetrician, an enormous mass of intestine.

I saw her at the end of 12 hours and found my patient in shock, temperature 100, pulse 160, respiration rapid, semi-unconscious. Examination of vulva revealed a laceration to rectum, and an enormous mass of small intestine lying between her legs, under her buttocks and over her legs. There was evidence of hemorrhage but none at the present time. The odor was awful. In places the intestine was filled with gas, again several feet would be paralyzed and stretched into a thin cord.

The intestine was simply stripped from its mesentery, and along this line thus made was a layer of clotted blood, showing the hemorrhage that had taken place was small in amount and easily controlled.

I next examined the cervix as well as I could by palpation alone, and found it not lacerated, but contracted down hard upon the intestines; it was, therefore, manifestly impossible to resect the paralyzed and infected gut and return it to the abdominal cavity per vaginam.

At 1 A.M., the patient was opened in the median line, and with the aid of two oil lamps for light, I turned out the uterus over the thighs, and after carefully walling-off abdominal cavity and its viscera, and washing protruding intestines, delivered, back through vagina and pelvis, and out of abdominal incision, the small intestine. Finding the lowest end of injured gut to reach to caecum, I cut it off and turned in the open end of caecum, with a circular suture, reinforced with several Lembert sutures of linen. Following up the infected gut until I came to where the mesentery had ceased to tear, I again cut off the gut and closed end of the small intestine in same manner. Then brought two ends together and did a lateral anastomosis, using Moynihan's suture method.

I then sutured the end of the mesentery to posterior line of anastomosis, so that it extended past the anastomosis to the healthy caecum. I did this, hoping to secure more nourishment, because I was afraid the entire tract was paralyzed, if not infected.

After this was completed, I turned my attention to the uterus, to repair the laceration in the body, which I found extending along the posterior surface, from fundus to about midway between internal and external os; here a line of rupture extended around the cervix, including about one half its circumference, just above the uterine arteries, making a T-shaped tear.

The anesthetizer informed me that the patient's condition was bad, so I sutured the tear as best I could, though it was almost impossible to place sutures in the circular tear, and after thoroughly washing pelvis, closed the abdomen, without drainage.

The patient was then brought to edge of table, vagina washed, perineum closed with silkworm gut, and a strip of 10 per cent iodoform gauze carried well into uterus, and another into pelvic cavity, through central portion of cervical tear.

The patient was returned to bed at 2 A.M., in seemingly a hopeless condition, but at 4:30 A.M. she was out of the chloroform, and her temperature was 98¼, pulse 130, respiration 26.

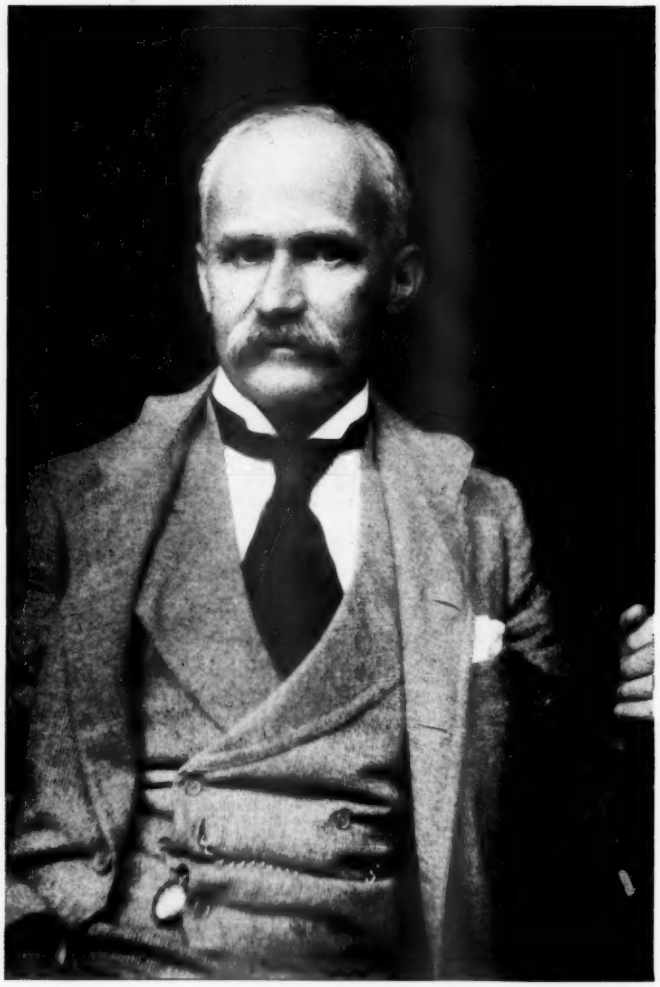
There was no nausea, and at 10 A.M. hot tea was given by mouth and by rectum a nutritive enema. Nutritive enemata were given every six hours from 10 A.M., August 19th to 10 A.M., August 24th, when nourishment was started, and well taken by mouth.

First bowel movement occurred spontaneously at 8 A.M., August 22d, and continued daily thereafter.

Patient continued in excellent condition until August 26th, when her temperature rose to 102⅘ after a severe chill at 6 A.M., and a foul, thin discharge started from vagina. Temperature that night was 104, and she began losing ground rapidly and died on August 28th, at 11:30 P.M., of septic metritis, the entire uterus seeming to be a sloughing mass.

After the operation was completed we measured the intestine removed and found it to be 126 inches in length. This caused me to doubt her ability to have enough absorbing area to live, it being nearly half of the small intestine; but as she lived ten days, and during the first seven days gained rapidly in flesh and strength, her bowels moving well, and she taking and retaining nourishment, I now firmly believe it possible to resect one half of the small intestine and have a patient enjoying fair health.

In reviewing this case, and knowing how well the patient felt as late as the 25th of August, "Well enough to get out of bed," to use her own language, I am led to believe, that had I been able to have added a complete hysterectomy to the operative measures used upon intestines, I would have saved a life; her condition at that time was too bad, however, to prolong the already hazardous operation. Again, the baby was born at noon August 18th, and the patient lay upon her exposed intestines, with an open avenue for infection for thirteen hours before the operation was undertaken, and infection certainly occurred, per vaginam, as the subsequent condition proved.



F. M. SANDWITH, M.D., F.R.C.P.

DEPARTMENT OF
NICHOLAS SENN FESTSCHRIFT

A TRAUMATIC CASE OF DIAPHRAGMATIC HERNIA

By F. M. SANDWITH, M. D., F. R. C. P.
Gresham Professor of Physic; Consulting Physician to H. H. the Khedive and to Kasr el Ainy Hospital, Cairo; Lecturer at the London School of Tropical Medicine and at St. Thomas's Hospital, London

ONE of the earliest writers on this subject was Dr. Bowditch, of Buffalo, who analysed 88 cases of all kinds of diphragmatic hernia which occurred between the years 1610 and 1864. In his list the hernia occurred 41 times on the left side, on both sides 3 times and only 18 times on the right side, for in 26 of his cases the site was doubtful. In 44 cases the stomach protruded into the thorax, in 30 the omentum was found there; and in no less than 9 patients the injury was caused by stabs with sword or lance, besides three doubtful cases under the heading of "wounds."

Struppler says that the number of recorded cases in 1901 had reached almost 500, and every succeeding volume of the Index Medicus tells us of additional instances since that date.

Excluding congenital cases, which constitute nearly half the published reports and are the result of some arrest of development in fœtal life, diaphragmatic hernia is interesting to both physicians and surgeons, because it is the form of internal hernia most commonly met with; and it is, so far as I know, the only form of internal hernia which can, under favourable circumstances, be diagnosed during life. Several cases, like mine, were suspected before death; but nearly always the accurate diagnosis has not been attained until the post-mortem examination.

The most likely traumatic causes are penetrating wounds or contusions of the abdomen, which accounts for the fact that most sufferers have been adult males. The abdominal organs entering the thoracic cavity are usually not covered by a hernial sac, consisting of peritoneum or pleura, thus technically producing a false diaphragmatic hernia. The left side is eight times more commonly affected, probably because the right side is protected by the liver.

The stomach is the organ which most frequently passes through the ruptured diaphragm, the transverse colon is also often involved, and, less commonly, authors have reported the presence in the thorax of the omentum and small intestine. In very rare instances, a portion of the left lobe of the liver or the pancreas and even the left kidney may actually be protruded into the chest.

Most authors confuse the congenital with the acquired cases, which makes their statistics less interesting. Mr. Pollock mentions two traumatic cases occurring in civil life. In the first, a man aged twenty, slipped while walking in his own house and gave himself a severe twist; death occurred 32 hours after admission to hospital; the opening of the diaphragm was then found to be in the posterior part of the left tendon, and was large enough to admit the hand. In a second case, a man, aged 40, fell from a great height onto the deck of a vessel, and died three months later; the rupture in the diaphragm was a little to the left of the œsophageal opening, about 2½ inches in extent.

In the present day, gunshot wounds are more likely than spears to effect an injury of the diaphragm. Among other cases recorded, I may mention four cases of gunshot wound of the diaphragm, reported by Sir Thomas Longmore. In the first, death occurred one year after the injury from strangulation after a full meal; in the second, the patient lived 22 years and then died from other causes; in the third, death resulted after six days from a double perforation of the diaphragm and a wound of the liver; in the fourth case, the patient succumbed after 16 hours from wounds of the lung, diaphragm, liver, and spleen.

For various reasons the following case has never been published, and it is, I venture to think, of sufficient interest to be placed on record.

At the beginning of 1884, while General Gordon was hurrying up the Nile on his last and memorable journey to Khartum, it became necessary to dispatch British troops to Saukin on the Red Sea coast, to deal with Osman Digna, who had succeeded in raising the tribes of the Eastern Sudan to enter on a holy war and fight in the Mahdi's cause. The tribesmen had been greatly encouraged by their recent success in annihilating a force of half-drilled, panic-stricken Egyptians, three times their number, who had been hastily massed together under the leadership of Baker Pasha.

On February 29, 1884, the British force found the enemy strongly posted at El Teb, and protected by parapets and rifle-pits. During the fight which ensued the cavalry charged the intrepid spearmen, who had all been assured of immediate Paradise and attendant houris in case of death. Many of the English riders lost their horses in the scrimmage, and of these only one officer, whom we will call X. escaped with his life. His horse was killed and he received thrusts from two spears which passed through his arm and penetrated his left side. Surrounded by numbers of yelling fanatics, he must have been killed had it not been for the devotion of Quartermaster-Sergeant Marshall, who rode to his assistance, seconded by Sergeant Fenton and Private Boseley. Marshall gave X his hand, and running in this fashion in rear of the charging squadrons, X, with the heavy spear swaying to and fro in his side, managed to get free of the enemy before he sank down. His attendant trumpeter, in spite of 16 terrible wounds, kept his horse going and escaped from the fight, to die of his injuries later.

X was carried safely back to camp and eventually to the Military Hospital

in Cairo. It was found that one of the spears had penetrated the wall of the chest between the ninth and tenth ribs on the left side, in the anterior axillary line. The wound was believed to be not deep, but it caused an external hernia of omentum, which was thought during life to be a portion of the lung. His wounds of arm and side healed satisfactorily, but two months after the injury there was still protrusion from the chest wound. The protrusion was bluntly conical in shape, with a base of two inches diameter and height of one inch.

Being a healthy man of 35 years of age, he was soon allowed to resume his military duties in a cantonment in the desert near Cairo. An exceptionally keen soldier, steeped in the best traditions of the British Army, and anxious to keep up the prestige of his regiment, which in previous campaigns had already done much to maintain the English hold on the Indian Empire, X could hardly be persuaded to spare himself either on parade or in taking an active part in the regimental sports, which are of so obvious a necessity for employing the leisure time of the men in a foreign country. Almost the only concession which he made to his friends' anxiety was to allow some one to run for him while he was batting in a cricket match.

On January 12, 1886, be was imprudently engaged in tent-pegging about 5 P. M., and, missing his peg, he received a severe shock and was obliged to dismount, owing to pain on the left side, which he at once connected with the upward thrust of the spear which he had received nearly two years before. On returning to his quarters, he was found by the army medical officer to be suffering from intense pain, chiefly referred to the epigastrium, but extending upwards towards the shoulders, outwards to the sides, and even to the vertebral column. There was great irritability of the stomach, but the amount ejected was small, consisting of mucus and, at times, grumous matter, resembling altered blood; his pulse was 75, of good volume; respiration normal except during the paroxysms of pain, when it became accelerated. Owing to the great agony he was in, a complete physical examination was impossible. His symptoms continued until 11 P.M., when the vomited matter increased in quantity, and was darker in colour;. this seemed to afford some relief, and he had painless intervals of about three minutes' duration. He became able to lie down, which had previously been impossible, but the slightest movement brought on a paroxysm of pain, followed by hiccough, retching, and vomiting of a small amount of fluid, which was considered to be in excess of the amount taken to drink. In spite of morphia, which was freely injected, he passed a sleepless night; and about 11 A. M., on January 13th, the pain again localized itself in the left side over the seat of the wound. As examination could now be tolerated, Surgeon-Major H. R. Green, from whose notes I am partly quoting, was able to find that there was dulness over the left pleura, as far up as the nipple line, and that on moving the patient, succussion sounds were produced, which were quite evident to the patient himself. The dulness changed with position, and above the nipple line the respiratory sounds were thought to be normal.

In the afternoon I was invited to see the patient in consultation, and found that a diagnosis of hyrdo-pneumo-thorax had been made by the army medical officers in attendance, and that it was proposed to draw off some of the fluid by means of an aspirator.

I found that there was considerable dyspnœa, which I was told was of recent occurrence, the area of cardiac dulness was displaced to the right, there was some falling-in of the abdomen, while the affected side of the chest was filled out and the respiratory sounds were completely suppressed over the lower two-thirds of the pleura. The presence of abdominal symptoms (hiccough, retching, and vomiting), the original absence of dyspnœa, the remembrance that pneumo-thorax occupies the whole pleura, and a general feeling that this case was unlike the instances of pneumo-thorax with which I was familar, caused me to dissent from the diagnosis; and the aspirator, which was in readiness, was removed. I suspected an injury to the diaphragm, but was hardly prepared for the state of affairs which I afterwards found. The patient was several miles from a hospital, and it was impossible to think of transporting him there, or even of performing any radical operation. Shortly after my arrival his symptoms became aggravated, collapse set in, and he eventually died of exhaustion at 10:45 P.M., about 29 hours after the tent-pegging.

Permission for an autopsy was declined, but circumstances enabled me 111 hours after death to make a limited examination of the body. The cicatrix on the left side was 1½ inches long, between the ninth and tenth ribs, and when the skin was removed the protruding tumour at that spot was found to be the size of a large walnut; it consisted entirely of omentum, which was firmly attached to the old wound, the length of the omentum between the curvature of the stomach and the attachment to the cicatrix was about 3 inches. The lower edge of the ninth rib was rough and bare, corresponding to the site of the wound. The left lung was lying in the upper third of the thorax. A huge rent in the diaphragm admitted both my hands flat, the edge of the opening being firm and elastic. The whole of the stomach was lying almost vertically in the left thoracic cavity above the diaphragm. The stomach contained a considerable quantity of grumous fluid. The hernia also consisted of much omentum and about one inch of duodenum, also lying above the diaphragm; the part resting on the diaphragm was extremely congested. The upper portion of the stomach, which consisted of the cardiac end, was normal both inside and outside. There was no abnormal fluid in either pleura, no wound of the left lung and no pleuritic adhesions. There was a marked difference of colour between the two lungs. The right was bright red, very much congested and emphysematous; the left was pale and ashy, and much smaller than the right; both lungs floated well. There was no apparent disease of heart, liver, or other organs.

It is impossiple to give an opinion as to how far or how little the diaphragm was injured by the spear wound, but it is probable that a perforation occurred

at that time, and that the fleshy part of the diaphragm was extensively ruptured, enlarging the perforation, at the time of the jerk when the patient failed to get his tent-peg.

Mr. Barnard, the latest writer on this subject, in pointing out the rarity of diaphragmatic hernia, states that it was found only three times in 13 years at the London hospital in 669 cases of intestinal obstruction, and in one of these three the obstruction was due to another cause. A case, something similar to mine, was operated upon by Battle; and Llobet successfully cured by operation, a diaphragmatic rupture which had occurred more than 10 years earlier. Other surgeons have recorded successes, provided the suturing has been done during the quiescent period.

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APRIL, 1908

GASTROENTEROSTOMY

Probably no operation in surgery portrays the gradual evolution of an almost perfect method from a primitive and rude one better than gastroenterostomy. In compliance with the brilliant and pregnant inspiration of Nicoladoni Wölfler, who on September 27, 1881, performed the first anastomosis between the stomach and jejunum, applied the bowel to the anterior surface of the stomach, so that its proximal end lay to the right, and its distal to the left. The gut, that is to say, was antiperistaltic in relation to the stomach. A speedy change to an isoperistaltic application of the bowel was made; but in both methods the serious and lethal factor in the after history was the occurrence of "regurgitant vomiting." To avoid this, or to abolish it when occurring, Braun introduced the principle of enteroanastomosis, the proximal and distal limbs of the jejunal loop engaged in the operation being united. The results certainly justified the additional time spent upon the operation. It was not long, however, before von Hacker advocated the posterior operation; the hinder surface of the stomach being reached through the transverse mesocolon. The results both, immediate and remote, of this procedure were at first but little different from those achieved in the anterior operation. Vomiting occurred almost as frequently, and secondary operations were demanded for the relief of this most harassing complication. In 1900, Czerny, by the agency of his assistant, Petersen, suggested that the jejunum should be applied to the stomach as close to the flexure as possible. Probably no single alteration, which has been made in the operation is of a value equivalent to this. The posterior operation is better than the anterior, for no other reason than that it permits the abolition of "the loop." In respect of ease, of time occupied, of visceral exposure, and so forth, there is little to choose between the methods, and in cases where the posterior operation, for mechanical reasons, is impossible, the anterior is still practiced with adequate success. But the posterior no-loop operation, judged by the immediate results and by the freedom from later complications, is probably the most successful of all abdominal operations of equal severity. The line along which the jejunum should be applied to the stomach is not a matter, as yet, upon which all surgeons are agreed. W. J. Mayo applies the bowel so that it lies from above downwards and from right to left. I prefer to make the jejunum lie almost vertical, with a slight inclination in the opposite direction. The need for the nearest possible approach being made to the flexure has recently been again emphasized by Dr. Mayo, who points out the need for the division of the mesocolic band when it is of unusual length. Adhesions of the jejunum to the

under surface of the transverse mesocolon are sometimes found, and may extend over six inches or more of bowel. They are encountered not very infrequently, and so far as my experience goes, fix the jejunum always on the right of the flexure. These adhesions, both normal and pathological, must be separated until the highest portion of the gut is available for the anastomosis. The technical details in operation are now, it may well be, perfect or nearly so. It remains to discover before the abdomen is opened what are and what are not genuine cases of organic disease of the stomach. The mimicry of the symptoms of ulcer or of cancer may be so exact that the most expert clinician may be at fault. But when the abdomen is opened, the surgeon's duty, so far as concerns gastroenterostomy, is clear. This operation is never to be performed in the absence of a lesion of whose existence even the most sceptical onlooker can be satisfied.

B. G. A. MOYNIHAN.

DR. STOWE'S TREATMENT OF PROLAPSE OF THE UMBILICAL CORD

AT a recent meeting of the Chicago Gynecological Society, Dr. H. M. Stowe presented a new method for the treatment of prolapse of the umbilical cord when the os is not dilated sufficiently for immediate delivery. Believing that the greatest dangers to the child are from compression of the cord by a uterus emptied of its liquor amnii, Dr. Stowe injects normal saline solution into the uterus, having first closed the cervix by means of a modified Voorhees bag.

The idea of injecting salt solution into the uterus to replace the liquor amnii is not new, but Stowe is entitled to credit for having published it, and applying it as a distinct method of treatment of a condition that has a high fœtal mortality,— prolapsed cord. That it will do much to reduce this mortality remains to be learned from experience. In the first place, the cord must be replaced above the head, which is not always an easy procedure; secondly, the bag must be introduced before the cord falls out again, which may not always be possible; thirdly, if the cord can only be replaced in the cervix on top of the colpeurynter, even though salt solution is injected into the uterus, the cord may undergo injurious pressure. Nevertheless the idea is ingenious, promising, and deserving of widespread trial in practice. One could use Stowe's bag in other conditions, as premature rupture of the membranes, in shoulder, breech, and even head presentations.

Years ago the writer conceived the idea of injecting salt solution into the uterus in cases of detachment of the placenta (abruptio placenta), with a view of thus forstalling over distention with blood. In a case of abruptio placenta with ruptured membranes, a tentative application of Stowe's bag, with filling the uterus with saline solution, might be made, while preparations for delivery were under way.

The dangers in the use of the bag are the same as those inherent in all colpeurynters: laceration of the cervix, rupture of the uterus, tumultuous labor-pains, and infection. Perhaps this bag is more likely to inaugurate violent uterine contractions, so that care is to be observed in our first trials. We do not know the actions of the uterus when it is distended after having once partially retracted on itself, nor can we imagine the effect of redistention of an already partially retracted placental site. Would the dilatation and contraction of the uterus loosen the placenta? Probably not enough fluid would or could be injected to accomplish this. The patient will require the constant attendance of the accoucheur, and the liquid will have to be let out at first indication of undesirable action.

JOSEPH B. DELEE.

TRANSACTIONS OF SOCIETIES

REGULAR MEETING OF THE GYNECOLOGICAL SOCIETY, DECEMBER 2, 1907

DR. J. B. DE LEE, PRESIDENT
DR. FRANK W. LYNCH, EDITOR

EXHIBITION OF INSTRUMENTS

DR. J. B. DE LEE: I have here three instruments that are of some interest. Scientific tests have shown that it is impossible to sterilize the hands, yet we believe that it is possible to sterilize them sufficiently to prevent the patient from being infected, so that the patient can take care of a certain amount of infection that comes from hands not absolutely sterilized. Rubber gloves, however, can be sterilized so that a man who completes an operation with intact gloves can feel that his hands have not infected his patient. The greatest danger of sepsis is through perforation of the gloves, and I think we should evolve a special technique for the use of gloves. In other words, we ought to consider that every puncture of the glove is an error of technique. Since puncturing is the strongest objection to the use of the gloves, we ought so to build our instruments, and arrange the technique of our work and that of our assistants that this factor may be avoided. After every operation, the operator should test his gloves and then count the punctures. By means of this drill and experience one becomes more perfect; and a succession of 10 or 12 operations have been done without a single puncture of a glove.

It is along that line I have designed these instruments, the point being to avoid sharp points in their construction, and as far as possible all cutting edges. A knife of course has to be sharp, but I have found that nearly all other instruments can be just as well dull. For instance, this ordinary tissue forceps is perfectly safe for the glove and will grasp the tissues to be held as firmly as the ordinary rat-tooth forceps. I have discarded all rat-tooth forceps, they are no better than the Pean forceps. The vulsellum forceps, are the worst enemy of the glove and ought to be discarded.

Here is a forceps for grasping the uterus post partum, and for nearly all purposes where the ordinary vulsellum would be used. These curved blades hold remarkably well. They are constructed on a double inclined plane and the tissues slip along into an angle, so that they cannot escape. These have been used in practice and do well. In those cases where it is absolutely necessary to have a point, as for example, getting hold of a fibroid for enucleation, the vulsellum has to be used, but the points can be bent in so that the end of the instrument can hardly cut a glove, except under great stress.

NECROSIS OF LARGE SUBMUCOUS MYOMA COMBINED WITH GANGRENE OF THE LEG; RECOVERY AFTER OPERATION. Dr. Georg Schmauch.

The case is of Mrs. S., who had the good fortune to recover from an operation that seemed hopeless. She is 51 years old, and has been married since her 16th year, and pregnant 4 times, terminating in premature labor, Mens VII; abortion Mens V, Mens III, and II. Her menstruation began at 14 years and had been regular until 3 years before the operation, although she always lost considerable blood. Since that time she has flowed almost constantly, with some interruptions. During the last year her menstrual discharge assumed an offensive odor.

In 1897 she first noticed a tumor in her abdomen, for which she consulted a physician in 1901, who advised an operation for fibroids of the uterus. I saw her first on the 7th of June, 1905, in the Elizabeth Hospital. She was there on account of unbearable pains in her right foot. These pains began three weeks before in both legs; she felt as if the circulation had stopped in both limbs. As she would not consent to an internal examination, she was treated for sciatica.

When seen in the hospital, she was in a very poor condition, emaciated, exceedingly pale, with a cachetic color. Her temperature varied between 100 and 102½, her pulse was irregular and weak, 110 to 130. Heart sounds clear. The abdomen was distended in the lower part by a larger tumor, extending up three fingers above the umbilicus. This tumor was larger than a man's head, slightly movable and presented some small prominences. Per vaginam an enlarged portion was felt connected with this tumor; the os admitted four fingers and the cervical canal was dis-

tended by a large soft mass. There was an abundant, bloody and offensive discharge from the uterus.

The patient's right foot was swollen, inflamed and very painful on touch, the first and second toe showing the beginning of gangrene. The urine contained no sugar, but showed traces of albumen without casts. Both femoral arteries were pulsating. The diagnosis was necrotic submucous myoma combined with gangrene of the foot. Naturally the question arose, whether there was any connection between the gangrene of the foot and that of the myoma. At first thought it seemed self evident, yet it was remembered that a woman in poor condition might have a marantic thrombosis or spontaneous gangrene. Gangrene of the extremities is not so rare following gynecological operations in the puerperium and in eclampsia as was formerly considered, as Dr. Reed has shown to this Society. However, a necrotic myoma, leading to a gangrene, has to my knowledge not been described. I did not review the whole literature of sequelæ after myoma, as this is only a casuistic report.

A decision one way or the other had to be made, as upon it depended further treatment. The amputation of the foot was the less serious operation; however, the surgeon did not feel inclined to interfere before a clear demarcation had set in and also regarded the sloughing myoma as the primary cause of the trouble. So I decided to remove the uterus, on the 11th of June, 1905. The operation itself was a typical supra-vaginal hysterectomy except for the enucleation of one fibroid that had developed within the right broad ligament. One ovary was not removed. An iodoform drain was inserted in the cervical canal and brought out in the vagina, and the peritoneum was closed over the stump. The operation was interrupted three times because the patient became pulseless, although the greatest care was taken in administering the chloroform combined with oxygen.

The patient recovered from the operation, although she was in a very critical condition for the first 6 days. Her temperature arose on the first day to 102. Her pulse reached 136, and was irregular. She was almost constantly orthopnœic and daily had two or three attacks of cardiac asthma. A liberal use of camphor and morphin aided the recovery. Altogether she did not suffer so much from the laparotomy as from the gangrene of the foot, the hourly expected lung embolism did not occur.

On the 23rd of June, 12 days after the first operation, Dr. Thilo amputated her leg. A demarcation had not yet set in. The gangrene was progressing and the black colored foot emanated a very offensive odor. The amputation was made in the middle of the leg, and both the tibialis antica and postica arteries were found closed by thrombi. When the Esmarch bandage was loosened there was no bleeding. The amputation wound as well as that of the laparotomy healed per primam. I might mention that her left foot became quite œdematous after the first operation so that the presence of gangrene had to be considered. During this operation we met with the same trouble in the anæsthetic but less than in the laparotomy.

On the 10th of August, two months after the operation, the patient had recovered so far that we could risk sending her home. The pelvis was free from all exudate. She is now looking healthy and walks around with an artificial leg. I am not able to demonstrate to you the amputated leg, but here, you see the uterus which we removed. It has shrunk a good deal in the fixation fluid, yet the submucous myoma still measures 8 inches in diameter. There are three larger subserous myomata, and several small submucous myomata. How great the pressure must have been to which this submucous tumor was subjected can be readily imagined from the retraction of the uterine walls after they were cut open. At present the uterus does not cover more than one-fifth of the surface of the myoma. This is due to the serous imbibition by the myomatous tissue and is the consequence of the insufficient nourishment and the impaired circulation existing in such a tumor. Even an intramural myoma can become so much distended by this pressure that perforation in the abdominal cavity results, as reported lately by V. Franque.

Our tumor has no pedicle, and was inserted broadly on the fundus and probably would have caused an inversion of the uterus, could it have been extruded into the vagina. It is generally stated that such necrotic tumors produce labor pains, as the uterus tries to extrude the foreign body. This patient had no such symptoms.

The mortality of such operations is very high. Czempin reported in the *Berlin Geburtsh. Gesellsch.* a year ago, three gangrenous myomata operations, two of which succumbed to sepsis.

Whether our tumor had been infected by virulent micro-organism is very doubtful. That saprophytis had invaded it, is on the other hand, manifest from the discoloration of its surface and the offensive odor of the vaginal discharge.

Whenever possible we operate such cases per vaginam. In our case the tumor was too large. We still read detailed descriptions of how the various authors have tried to disinfect the de-

cayed tumor and the vagina. V. Franque for instance, thinks he saved some of his patients by tamponing the vagina with 10 per cent formalin gauze. I am more of a fatalist and do not have much belief in the disinfecting powers of antiseptics. For me it is an established fact, that all our antiseptics coagulate albumen, and therefore have none but a superficial effect, even in necroctic tissues.

It certainly is advisable to sew up the vaginal portion of the cervix. Vaginal douches of bichloride and iodoform gauze tampons were all that was done in my case. Histologically, the tumor does not show anything special. The uterus is generally myomatous. The small tumors are real fibroids, showing hyaline sclerotic degeneration, and the beginning of calcification. The large submucous tumor is not totally necrotic. The greatest part of the tissue is discolored and microscopically shows necrotic tissue that stains poorly or not at all.

The complete disappearance of all muscular tissue is worthy of note, contrasting vividly with the well-staining fibrous tissue, part of which gives the impression of young tissue. The growth is rich in blood-vessels; in most of them the circulation has ceased, and their walls are degenerated. In other parts the degeneration, following the course of blood-vessels spreads wedge-shaped through the tumor.

The mucosa excepting in the lowest part of the tumor is intact, yet is drawn out into a narrow line. The glands form long and narrow slits. In contrast to the degenerated interior parts of the tumor, the capsule seems to be fairly nourished. Many mast cells are seen as they are found regularly in myomata, even when calcified, mainly around the blood-vessels. This tumor shows them in greatest abundance in the capsule.

A few words regarding the combination of gangrene of the foot and necrotic myoma. As was said before, I regarded the necrosis of the submucous myoma as the cause of the gangrene. Whether it was the primary cause, is hard to prove. The debilitated condition of the patient, her extreme anæmia, her weak heart should be sufficient to warrant a marantic thrombosis. There never were symptoms of an infarct of the lungs. She coughed a great deal during the time the gangrene developed but no blood was expectorated. The embolus might equally well be derived from a thrombosis of the uterine artery and the spermatica, through their anastomosis. At the operation no special attention was paid to the condition of these vessels. The histologic examination of the blood-vessels of the leg has been, I am sorry to say, omitted. The intima did not show microscopically any signs of obliterating endarteritis.

I did not report this case for the purpose of calling your attention to the danger of myomata. A myoma is generally a perfectly harmless growth, unless it develops submucously.

Concerning the causes of the necrosis, I might repeat, what I said in reporting a case of mortification and spontaneous elimination of a large myoma in the *Central. f. Gyn.*, 1902.

It is a kind of anæmic necrosis, brought on by gradually diminution of nutrition. Such a tumor outgrows its natural supplies of nourishment. The consequences are disturbances in the circulation. Such a tumor does not become completely necrotic at once, more frequently a softening and liquefaction of the central parts take place. It is a slowly advancing necrobiosis.

While the cystic myomata of the uterine body are very seldom infected, those that develop submucously become so. In the case mentioned before, the softening had progressed so far that only a sac, the capsule, remained; it was a case of septic gangrene. It is doubtful whether bacterial influences played any part in bringing on necrosis in the case presented to-night. The favorable result of the operation speaks rather in favor of an aseptic gangrene. This woman would never have come to an operation, but for the gangrene of her foot; the myoma would have softened gradually and would have been expelled spontaneously.

DISCUSSION OF DR. SMAUCH'S CASE.

DR. CHANNING W. BARRETT: I thought in this connection it might be interesting to relate briefly a case seen recently at the County Hospital. I was called to see this case, which was in the service of another man. The uterus was supposed to be four and a half months pregnant, but I found it rather too hard to be pregnant that length of time. There was a body presenting through a dilated cervix, that, on first examination, might be taken to be the head of a fœtus, but it was found not to be. She lacked many of the symptoms of pregnancy and yet there appeared to be evidence that she was having an abortion. There were some contractions and the temperature at that time was 106. The septic gangrenous fibroids were cleaned out of the uterus and she immediately began to improve, but, contrary to Dr. Smauch's case, an embolus took place after several weeks, when she had almost gotten in a condition where we thought we would remove the tumor, and she had a septic condition of the lung. She then passed out of my care and I understand that she died later of sepsis of the lung.

REGULAR MEETING OF THE GYNECOLOGICAL SOCIETY, JANUARY 17, 1908

J. B. DeLEE, M. D., PRESIDENT,
FRANK W. LYNCH, M. D., EDITOR

EXHIBITION OF SPECIMENS

DR. J. B. DE LEE: I have here a specimen of fœtus compressus which was delivered last night. It is similar to one Dr. Reed exhibited a few weeks ago, and is only of clinical interest in the matter of diagnosis. The woman was in her second pregnancy and had been in labor since yesterday morning. The pains were infrequent and weak, and in the evening the physician recognized what he thought was a face presentation with prolapse of the arm. On internal examination the finger at once came upon a soft mass with sharp points, which was recognized as the depressed head of a fœtus compressus with sharp points at the edges of the cranial bones. The body lay across the os and prevented the engagement of the head. It was removed without difficulty, the pains came on very strongly thereafter and the child was born a few hours after. A portion of the placenta is completely thrombotic and organized, as is usual in such cases. The question as to whether this fœtus comes from uni-oval or bi-oval twins cannot be decided from examination of the placenta, because of the condition of the septum. The sex of this child is probably male, and the other child being female, would show that there were two eggs concerned in this pregnancy, because uni-oval twins are always of the same sex.

Dr. Chas. B. Reed then presented a case of repeated Mechanical Ileus in pregnancy, due to adhesions from appendectomy, and followed by abortion.

Mrs. K. S., age 24, married 6 years. Her health always had been good until 9 years ago, when she had appendicitis and was operated for it. She entered Wesley Hospital, November 18, 1907. The histories of her pregnancies was as follows: Five years ago she miscarried at the seventh month, the child lived 36 hours; three years ago, abortion at the second month; two years ago, premature labor at 8 months, the child lived. November 16, 1907, had a sensation of bloating while eating, shortly followed by excessive eructations of gas, together with a sharp cutting pain in the median line above the symphysis. Then developed vomiting of bitter greenish fluid together with food and mucus. No flatus was passed by bowel, nor any fæcal matter, save a few small particles which came away with an enema. There was no history of a definite chill, although the patient occasionally felt feverish. She stated that the urine had been passed with difficulty and intermittently since the beginning of the attack. It, however, was clear and apparently normal in appearance. She gave the history of similar attacks preceding the first, second, and fourth pregnancies, with abortion or premature labor following in each case. On admission, the temperature was 100.2 F., pulse 110, respiration 26.

In view of the history, a diagnosis of Ileus, due to pressure from the growing uterus, was made; and operation was decided upon to preserve the present pregnancy if possible, but at least to aid future ones.

Operation. Median incision; bowels found adherent to the scar in the right abdominal wall, near the former site of the appendix. The adhesions were dense and the bowel was liberated with difficulty. The uterus was enlarged to the size of a six and one-half months' pregnancy, and was pressed firmly upon the adherent bowel and compressed it, thus causing the obstruction. After the operation, the bowels responded to enemas and the patient passed gas and fæcal matter. Labor began six hours after the operation, and the woman delivered herself in three hours of an infant that lived a few hours. Twenty-four hours after the operation the temperature was 100. F., the pulse 120, and respiration 24. From two to four bowel movements occurred daily after the operation. On November 22 the temperature, pulse, and respiration fell to normal, and since that time there has been normal convalescence.

DR. C. W. BARRETT, then reported a case in which retained membranes, together with abdominal symptoms, following thrombosis of the mesenteric vein, simulated rupture of the uterus.

I wish to report briefly a case in which some portions of retained placenta together with thrombosis of the mesenteric vein simulated rupture of the uterus with prolapse of bowel through the rent in the uterus. The case was referred to my service in Cook County Hospital, with the following history. She had been delivered in the obstetrical service of the hospital three days previously. It appears that the interne who attended her at that

time, found the placenta retained and attempted its manual removal. As this proved very difficult, he presently desisted in his attempt and some time later the placenta was expressed torn and ragged, so that it could not be determined whether it was complete or not. For two days the patient did well. Then appeared fever and presently distension of the bowels. On the evening of the third day, something was seen protruding between the labia. After examination the interne reported that the protruding mass was bowel.

When I saw the case there was no difficulty in tracing the mass up to the uterus, and thinking it was bowel I feared to exert pressure upon it, but thought it wiser to open the abdominal cavity and work from above. Accordingly incision was made and the fundus inspected. Much to our surprise no rent in the uterus could be seen, and save some adhesions of the sigmoid no bowel could be found in close apposition with the uterus. The condition of the small bowel was then determined. A large part appeared gangrenous and near the duodenum was adherent. Altogether about 12 inches of the upper gut was absolutely dead; and as we traced it downward, marked disturbance in the circulation was seen so that little, save that part immediately proximal to the cæcum, was perfectly normal. Inasmuch as the necrosed portion of the bowel was so extensive that its removal appeared incompatable with life, the larger part of the small gut was placed upon pads and observed while salt sponges were placed around it. It appeared to improve in color while this was done: so in the forlorn hope that it might improve after release of the adhesions and the resection of the gangrenous portion, the upper and necrosed portions were resected and the ends joined with a Murphy button. Immediately after the operation the patient's condition appeared to improve, but the next morning she was seized with apnœa and became blue and died suddenly. The cause of death was not absolutely known, although it was believed that it was due to pulmonary embolus. No autopsy was held, save the abdomen was opened sufficiently to secure the button. At that time the intestines were observed to be nearly black for a considerable distance below the point of resection. No thrombus could be determined.

I neglected to say that during the operation, after the abdomen had been opened and no perforation of the uterus discovered, an assistant examined below to discover the character of the mass that had been mistaken for bowel. This was found to be a portion of placenta which had become inverted, and due to the accumulation of fluid behind the membranes, gave the appearance of bowel. This furnished the vaginal symptoms, while the disturbance of the circulation of the bowel gave abdominal symptoms which simulated rupture of the uterus with prolapse of the intestine.

Dr. Channing W. Barrett then read a paper entitled, The Fallacies of Intra-Abdominal and Atmospheric Pressure as Supports of the Uterus and other Abdominal Organs. (See page 369.)

Discussion of Dr. Barrett's Paper

Dr. C. S. Bacon: This is a very complicated subject and it would be easy to get lost in its discussion. I believe many of the statements the writer has made are correct. He has called attention to the mistakes made by some authors, but I cannot help feeling that there are one or two points that have been left obscure; and I believe the writer himself is in error on one or two points. The object of the discussion is a study of the supports of the uterus and of the pelvic and abdominal viscera; and I would begin with one of his conclusions, namely, that the uterus is held in place by its supports. He does not state what those supports are, and without such statement it is rather difficult to know exactly what is meant. He speaks of the support that is obtained from the round ligaments, the utero-sacral ligaments and also from the broad ligaments. The broad ligament as a support of the uterus is somewhat complicated. Just where the support to the uterus comes in the broad ligament, needs careful elucidation. The peritoneal covering which forms the fold of the broad ligament, we might say has some value, but I take it the chief support there is from the fibers that adhere to the uterus and run into the uterus, following the vessels that end in the uterus. That is what I understand by the broad ligament being a support of the uterus. Those supporting fibers have been described by some as the cardinal ligaments.

The statement that the uterus is held by ligaments and is not held by pressure, is a question I would like particularly to consider, especially the statement of the writer as to Sielski's argument on the value of atmospheric pressure in holding the uterus in place. It is not clear to me, notwithstanding the arguments of the writer, that atmospheric pressure has no bearing here. It was not clearly stated by him what *intra-abdominal* pressure is and how produced. The writer seemed sometimes to distinguish intra-abdominal pressure from force produced by gravity or some other force. But without considering that, it seems to me that atmospheric pressure has a bearing in the abdominal cavity as much as it has outside of it. The simple fact that two surfaces are within

the abdominal cavity does not mean that they are not exposed to atmospheric pressure. So I fail to see why atmospheric pressure does not have some bearing on organs like, for example, the bladder, the uterus, the diaphragm and the liver when inside the abdomen. The old experiment, the author called attention to of the smooth stone lifted by atmospheric pressure, by the leather or rubber disk to which a string is tied, it seems to me is very similar to the lifting of the liver by the diaphragm. We have the diaphragm in contact with the upper surface of the liver, and whether the liver and the diaphragm are inside of the abdominal cavity or outside, the atmospheric pressure is certainly going to keep the two surfaces in union until something pries them apart. It is the same with the uterus. The normal uterus lies upon the bladder. When it is flexible and smooth and the bladder wall is also flexible and smooth, the two adhere by reason of atmospheric pressure; and until something comes between them, until they are pried apart, they are adherent. I think atmospheric pressure has some force in holding the uterus in that position, and some force in holding the liver against the diaphragm. I do not see how that can be disputed.

Now, what can get between them? Of course in the experiment which the writer gives in the specimen just passed around, we have free fluid circulating, and this fluid easily rushes between two surfaces. That is true. But a certain amount of tension is required before they separate so that the fluid can rush in. Besides, in the abdominal cavity we have not exactly the same conditions as here; there is ordinarily no free fluid. But even in the experiment I should feel like disputing the writer's assertion that the glove finger is easily separated from the bladder wall. If one picks up a portion of the wall, next the edge of the finger, the fluid rushes in, but if it is picked up carefully opposite the middle of the finger you will see that the finger does follow the wall. So I should dispute the statement that it very easily separates. If we make this experiment with exactly similar conditions to those inside of the abdomen, we must be careful to separate the wall from the substance inside at the middle, so that there is a surface that is adherent around the circumference of the point of tension. In short, I cannot agree with that portion of the paper where the statements of Sielski are attacked as being absurd. I believe atmospheric pressure acts inside the abdomen just as much as it does outside; acts everywhere, and without that support I believe the ligaments would soon lose force.

I will not go into any other points of the paper, except to call attention to one statement which perhaps was made inadvertently, or perhaps I did not hear aright, namely, that the vagina is a part of the levator ani muscle. The vagina is not attached to that muscle, which simply surrounds the vagina. Strictly speaking, the vagina is not a part of the floor, in the sense that the lower portion of the rectum is, that is, connected with the levator ani.

DR. J. B. DE LEE: I will say nothing about the physics of the abdomen, but on the question of natural philosophy I would like to say a word in defense of Penrose. I have many times held a tube full of water vertically and the water would not run out, but if I slanted the tube so as to let air reach the surface of the water, it would run out. I have filled a wine-glass with water and put a piece of tissue paper over it, inverted it and atmospheric pressure held the water up in the wine-glass. The reason a wine-glass cannot be held inverted full of water and uncovered, without its running out, is because it is impossible for the human hand to support the glass in a perfectly vertical position; the under surface will always receive a tilt which will start a current of water on one side and of air on the other side. So I would side with Penrose on purely physical grounds.

DR. CHANNING W. BARRETT, in closing the discussion, said: Dr. Bacon's discussion agrees exactly with Dr. Sielski's opinion, that is, the organs in the abdomen are quite different from anything else that we have to deal with; we cannot look through the mask and see how certain organs arrange in the abdominal cavity, and that these organs must have a certain support other than atmospheric pressure. This rubber bag (holding an apparatus in his hand) simulates the abdomen as completely as can be. We have the elastic sac, the glove fingers with their contents completely filling the sac, with a little fluid in the cavity. There is always some fluid in the abdominal cavity, and sometimes there is a great deal. Dr. Bacon calls attention to the fact that this rubber glove is not like the abdomen, because there is fluid in this sac. If the absence of a quantity of fluid in the abdominal cavity is the thing which makes atmospheric pressure supportive, then this support is lost as soon as ascitic fluid accumulates. To be brief, there is nothing in the question of atmospheric pressure as a support to the abdominal organs. It does not support the organs in the abdomen any more than it supports wood in a stove, wheat in a sack, or pictures on the wall. It cannot be counted upon to support the abdominal organs any more than we can count upon atmospheric pressure to hold a building up. Out

at the stock yards they realize that if they are to put intestines in a tub, the tub must be right side up; that they cannot depend upon atmospheric pressure holding them in a tub bottom-side-up.

Dr. Bacon calls attention to the fact that this rubber glove is not like the abdominal cavity, and yet he uses his best argument in saying that it is like the abdominal cavity; that a great deal of resistance is encountered in pulling the wall outward. If Sielski and Dr. Bacon mean that pulling the abdominal wall from the intestine lying next to it requires overcoming the resistance of the abdominal wall itself, I agree with them. We have to overcome the resistance of this elastic wall to pull it away from its contents. The illustration of the rubber disc and the stone, of which Dr. Bacon speaks, has no bearing whatever upon this: because in making traction upon the disc, it is raised in the center thereby causing a vacuum which has to be overcome. Here one intestine may be made to leave another fairly easily. There is no more difficulty in moving the contents of the sac here than if there are in a pail. Atmospheric pressure tends to prevent a vacuum within the sac, but it presses the sac inward at the point where the contents have less tendency to make pressure, that is, in the upper part of the sac.

In regard to the vagina attaching the uterus to the pelvic floor, I would say that the uterus lies above the pelvic floor and receives no support directly from the pelvic floor.

Dr. DeLee says he has often held a tube bottom-side-up and the contents staid in. I will say that he can do this only in the case of a capillary tube. He has filled a glass with water, placed a paper over it, turned it bottom-side-up and had the paper remain on. True; why? Because the moisture around the paper furnished capillary traction that keeps air from entering the glass; but we must remember that Penrose gives this as an illustration of why the intestines do not fall out through the pelvic floor, when the woman has laceration of the perineum. Dr. DeLee says that Penrose's illustration holds good in any sized tube, if it is held absolutely perpendicularly. The water runs out of the tube because of his inability to hold it perpendicularly; yet can a woman be depended upon to hold her body more perpendicularly than Dr. DeLee can hold a test tube? Penrose undoubtedly made a mistake and meant a capillary tube, but that has no bearing upon the question, because, when dealing with the capillary tube, we are not dealing with a woman.

Gilliam speaks of making a single tap in a barrel without escape of the contents. I believe the contents of the barrel may escape more rapidly if an opening is made above the fluid, but they will just as certainly escape through one opening made at the lowest point.

DR. HERBERT M. STOWE then read a paper entitled, "The Death of the Mature Fœtus in Labor." (See page 356.)

DR. LYNCH: I would ask if Dr. Stowe made any effort to ascertain the site of the cerebral hemorrhages? What proportions were localized about the meningeal arteries and were due to a rupture of those vessels, and what number at the base of the brain?

DR. STOWE: Fifteen or twenty per cent were due to the rupture of the meningeal vessels, and about 50 per cent were noted in the base of the brain.

DR. LYNCH: Did you consider the hemorrhages in the base of the brain as the primary cause of death?

DR. STOWE: It is always hard to ascertain the exact cause of death in children. Probably these children died from hemorrhage into the lungs, or into the lateral ventricles.

DR. LYNCH: The matter is of interest to me because I believe that in many instances, especially in children who have died in the uterus before term and before the onset of labor, we frequently see engorgement of the vessels at the base of the brain together with some little extravasation of blood and serum about the vessels. I am sure that many have believed that this caused death, although it has always appeared to me that it was better interpreted as a phenomenon occuring in the death agony. I mention this because I have in my mind a certain surgeon, well known as a specialist in brain surgery, who advocated very properly operative measures upon children who were thought to have cerebral hemorrhage. I happened to see the material which he studied preliminary to his first operations in such cases. Many of the autopsies were upon still born premature children, and he, in my judgment, erroneously interpreted slight extravasations of blood at the base of the brain as the cause of death, and used the cases as illustrative of the frequency of cerebral hemorrhage following trauma in birth, thus giving figures unduly high. Had he been as familiar with the pathology of the new born as he was of mammary cancer, his paper would not be open to criticism. Hemorrhage from rupture of the meningeal arteries is not found in small premature children born after short spontaneous labors.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D.
FREDERIC A. BESLEY, M. D.
WM. C. DANFORTH, M. D.
AIMÉ PAUL HEINECK, M. D.
E. WYLLYS ANDREWS, M. D.
WM. R. CUBBINS, M. D.
M. G. SEELIG, M. D.
GEO. E. BEILBY, M. D.

ABSTRACTS FROM THE FRENCH CONGRESS OF MEDICINE HELD IN PARIS, OCTOBER 14–17, 1907

PREPARED BY AIMÉ PAUL HEINECK

From the Revue de Chirurgie, December, 1907

ULCER OF THE STOMACH

There was a discussion on ulcer of the stomach in which several surgeons participated.

M. LINOSSIE said that simple ulcer of the stomach has a natural tendency to cure. In his opinion, the indication is to remove all those causes that interfere with healing. These causes are the movements of the stomach, the irritation due to food, and the digestive action of the gastric juice. The therapeutic means of our disposal are of three kinds: dietetic, medicinal, and surgical.

The dietetic measures would like to suppress all gastric activity. They wish to obtain physical rest of the stomach, so as to facilitate the cicatrization of the ulcer. In practice, the dangers of inanition are an obstacle to the realization of this complete stomachic rest. There are two forms of extra-gastric alimentation — the subcutaneous and the rectal. Excluding water and salts, subcutaneous alimentation can furnish to the organism only fatty substances; that is, food substances which are highly thermogenic, but only slowly utilizable. Subcutaneous injections of albumen and of sugar are dangerous. Rectal feeding, though far more important, is insufficient. The quantity of albumen absorbed cannot suffice to maintain the *nitrogenous equilibrium* in an individual, fed exclusively per rectum. Emulsified fats are absorbed, but always in quantities inferior to those which normal alimentation introduces into the human organism. Despite its shortcomings, there is no valid reason for the non-employment of rectal feeding. It does not disturb, or only to a very slight degree, the stomachic rest, either from the standpoint of secretion or motility.

Treatment by absolute stomachic rest is essentially a temporary treatment, to which must succeed a treatment based upon rational dietetics. The food of a patient suffering from ulcer of the stomach should meet the following requirements: It should cause no irritation of the stomach wall; thus it should be liquid or *soggy*, and neither too warm nor too cold. It should remain the least possible time in the stomach. It should excite to the minimum the secretory activity of the stomach, so as to lessen as much as possible the digestive action of the gastric juice upon the walls of the ulcer.

This problem exists: Is it more useful to reduce the gastric secretion to its minimum, or to make no attempt to reduce it, but to neutralize it by albumenoids which will saturate the gastric juice after it is produced? Cruveilhier first suggested the use of milk in these cases, and we believe that a milk diet is the diet which best meets the therapeutical indications present, being superior to the albumenoid diet of Lenhartz and to the fat diet of Senator.

The medicinal treatment is only of secondary importance. Alkalies and bicarbonate of soda have a soothing action during the acute period. Subnitrate of bismuth, in big doses, quiets the pain but does not modify the hyperchlorhydria. To us the use of nitrate of silver or perchloride of iron seems of doubtful benefit. Olive oil is, usually,

poorly tolerated. Karlsbad water only slightly hastens the evacuation of the stomach.

Surgical treatment is first indicated after medical treatment has failed. The excision of the ulcer is an operation of exception. The most useful operation is gastro-enterostomy. It is especially of benefit when a pyloric stenosis co-exists. Simple, non-complicated ulcer of the stomach demands medical care; to be successful, medical treatment should be sufficiently thorough and prolonged.

COMPLICATIONS OF GASTRIC ULCERS AND THEIR TREATMENT. Castaigne et Dujarier.

Complications of gastric ulcer may be supra-acute, acute or chronic. *Supra-acute complications:* Among these, we will mention diffused peritonitis due to perforation, a diagnosis of which should be made at the onset by the *suddenness*, the intensity and the seat of the pain. Repeated vomiting, abdominal distension, alterations of pulse and temperature are symptoms of perforation, but they may or may not appear immediately at the onset of perforation. One must not wait for their appearance to make the diagnosis. Surgical intervention should be early. As another complication, we have profuse hemorrhages, due to the involvement of an artery by the ulceration. These hemorrhages imperil the life of the patient. In a general way, the results of intervention in these grave hemorrhages are very inferior to those of medical treatment.

Acute Complications: Localized peritonitis, perigastric and subphrenic abscesses. They are often of difficult diagnosis. The treatment is surgical. It consists in finding and incising the pus-collection, and evacuating its contents.

Chronic Complications: They include accidents, some of which are mechanical, due to the development of fibroid tissue around the ulcer: Perigastritis and various forms of stenosis, cardiac, medio-cardiac, and especially pyloric; others affect the body of patient in general, determining anæmia and nervous disturbances, etc. Another possible chronic complication, according to some, is the transformation of the ulcer into a cancer, and the development of the cachexia of malignant disease. These chronic complications, as soon as they have been positively diagnosed, demand surgical intervention.

What can we expect of the different forms of treatment?

Medical treatment gives the best results in the abundant hemorrhages, in pyloric spasm, in disturbances of the general health. It often prevents complications and should be continued after surgical intervention, so as to obtain the maximum benefits of the latter.

The operative treatment cannot be recommended as a prophylactic measure. When it becomes necessary, what shall it be? A gastro-enterostomy is the most ordinarily performed operation, and perhaps is the most useful. It places the stomach, the seat of a pyloric ulcer, in a mechanical and chemical condition that favors the healing of the ulcer. Pylorectomy suppresses the pyloric ulcer, and would seem to be (a priori) indicated in all the cases. Its limitations are partly due to the fact that gastric ulcers are frequently multiple; partly to the fact that owing to the presence of dense adhesions, extirpation is not practicable. It is possible for a new ulcer to develop after pylorectomy. Thus there is no really curative operation for ulcer of the stomach. Any of the different operations may be indicated, depending upon the circumstances. We must always keep in mind the complications that may follow the operation — the vicious circle, peptic ulcers, and the secondary dyspeptic syndrome. To avoid them, it is necessary to institute a prolonged medical treatment. We think it would be dangerous to accept the conclusions of some surgeons, that ulcer of the stomach is incurable medically, and that the condition belongs entirely to the domain of surgery. The following conclusion is more in harmony with facts:

Round ulcer of the stomach, in the absence of complications, should be treated medically. If complications develop that demand surgical treatment, the latter should be immediately instituted. After operation, the patient must be subjected to medical treatment; otherwise new accidents may develop.

DOYEN. The former speakers have acknowledged the value of surgical treatment for the complications of gastric ulcer. The operations then performed are *emergency* operations, the advantages of which are not debatable, whether we are dealing with an alarming hemorrhage, or a perforation, or a case of complete stenosis, or a bilocular stomach. I shall discuss exclusively the surgical treatment of uncomplicated ulcer of the stomach.

Two operative procedures are here of value. The resection of the ulcer and gastro-anastomosis. Resection of the ulcer is an exceptional operation. It can be performed only for an ulcer of the pylorus or of the greater curvature. I have practiced this operation twice with success in a case of a circumscribed pyloric ulcer. I performed a pylorectomy with a gastro-enterostomy. Upon another patient, I resected a bleeding and very painful callous ulcer, located near the greater curvature. The functional results following these two operations were perfect. This operation is impractic-

able, if the ulcer be seated upon the lesser curvature, or upon the *fundus* of the stomach.

We come to the question of gastro-anastomosis, of which I have been one of the promoters for the treatment of gastric ulcer. The distension of this organ, alternating with its evacuation, is one of the particular causes of the non-cicatrization and of the persistency of gastric ulcers. In 1895, I said that "all non-cancerous affections of the stomach which do not yield to medicinal measures, and which provoke a serious wasting of the organism, are henceforth in the domain of surgery." I demonstrated, in 1895, the important rôle of spasmodic contracture of the pylorus in gastric pathology. In dyspepsias, and particularly in ulcers of the stomach, the pylorus is the seat of a reflex spasmodic contracture which leads, in the end, to a hypertrophy of the sphincter. I have shown that a well-performed gastro-enterostomy causes a disappearance of the ulcer of the stomach, and I have since acquired the certitude that when the operation is unsuccessful, it is due to the defective working of the new pylorus. Pyloroplasty of Heinecke and of Mikulicz, appear to me very inferior to gastro-enterostomy. Gastro-enterostomy presents the advantage of being applicable to all cases. It does not, however, re-establish the normal working of the stomach as well as a well-performed good pylorplasty.

In 1898, I modified the technique of pyloroplasty. In a case of pyloric ulcer, located at some distance from the pylorus, and in which the first portion of the duodenum was very accessible, I performed a new operation, gastro-duodenostomy, with section of the pylorus. I recommend this operation in all cases of gastric ulcer located at some distance from the pylorus. The operation can be performed in from twenty to thirty minutes and gives excellent therapeutic results.

HARTMANN, Paris. First of all, the surgeon must beware of nervous dyspepsias. For simple gastric ulcers, surgical treatment can be of great service. Performed under good conditions, the operative mortality is almost nil. The late results are good. Should a patient, later, owing to errors of diet, have accidents, these heal far better with medicinal measures than they would if surgical intervention had not been previously resorted to. The operative indications are: pyloric or medio-gastric stenosis, small repeated hemorrhages, adhesive perigastritis, non-complicated ulcer which has not been benefited by medical treatment, and especially if the pyloric syndrome is present. There is no debating the fact that perforation and perigastric abscess are imperative indications for operative treatment. Pylorectomy should be employed in those cases where one fears cancer, and in those cases in which the ablation of the pyloric ulcer is not surrounded by too great difficulties. Gastro-enterostomy is the operation oftener performed. Once gastro-enterostomy has been performed, the patient should be put in the hands of a physician, who will decide as to his diet and as to appropriate internal medication. Evidently, if surgical treatment is so often indicated, it is because the late results of medical treatment are not ordinarily brilliant.

MONPROFIT, Angers. In a number of cases, for purely social reasons, it is impossible long to continue medical treatment. When, in patients suffering from gastric ulcer, the accidents re-appear, after each fatigue, after each dietetic error, one intervenes surgically and can but be thankful for having operated. In perforation, in abscess, and in stenosis, we all agree that operative treatment is the treatment. In hemorrhages, we must distinguish between the abundant hemorrhage for which surgical intervention is so grave that it must not be attempted, and the small and repeated hemorrhages that are benefited in a surprising way by operation.

As to the late results of gastro-enterostomy, one must distinguish between the accidents reported by Parmentier and Denechau. Some of these accidents are characterized by dyspeptic symptoms, with vomiting of food. They are due to an operative mistake, to an obstruction of the gastro-intestinal mouth. I have assured myself of this in a few cases and a new intervention secured complete relief from the symptoms. The neuropath before the operation remains a neuropath after the operation; so I will insist, as Dr. Hartmann has, that we must beware of the nervous dyspepsias. I acknowledge that gastro-enterostomy is not suited to all cases; but I also emphasize that, when it is performed in judiciously selected cases, it gives excellent results. In cases of hyperchorrhydia, gastro-enterostomy may be followed by peptic ulcers.

TUFFIER. I have attempted to study experimentally the pathological physiology of gastric ulcer. It is impossible, however, to obtain, in a dog, lesions analogous to the stomachic ulcer or to pyloric stenosis. I have noted that after the performance of a gastro-enterostomy in a dog, after ingestion of bismuth, the X-rays show that the stomach empties itself by the pylorus and not by the artificial gastric opening.

In the profuse hemorrhages of simple ulcer, it is better not to operate. The ulcer is difficult to locate, and the long operation, which its search would necessitate, is contra-indicated by the serious condition of the patient.

As to the repeated hemorrhages, they are usually associated with other accidents, which accidents of themselves call for operation. In the presence of gastric adhesions, we must not be too hasty about operating. Stenoses command intervention, even if they be moderate in degree. Pyloric ulcer, owing to the frequency with which it determines stenosis, is a frequent indication for operation. Resection of the ulcer has only one argument in its favor, the possibility of secondary cancerization. Ablation must be made, if it be easily practicable. This facility of execution is a condition which we do not often meet, and therefore, gastro-enterostomy is the operation most frequently performed. It always secures a marked improvement and sometimes cures. It is evident that it can not give equally good results in all the different cases.

BOURGET, Orne. Even in the presence of hemorrhage, the stomach can be washed. Washing with water, to which is added tincture of chloride of iron, gives excellent results. The question of milk diet is delicate. The milk alone becomes acid one hour and a half after its ingestion. If boiled, the acid is less marked. By the use of alkalies, we should aim to correct the gastric secretion more than to suppress it.

BARD. Gastric ulcer frequently heals spontaneously. This is proven by the frequency with which healed ulcers are noted at autopsy.

EXOPHTHALMIC GOITRE

THE ETIOLOGY AND TREATMENT OF EXOPHTHALMIC GOITRE. Ballet et Delherm, Paris.

The most diverse theories have been advanced as to the cause of Graves' disease. Some consider this disease a neurosis; others, as a consequence of some disturbance of the bulb, either functional or organic; others, as the result of a disturbance of the sympathetic system, and still others look upon this disease as a disease of the thyroid gland. Different treatments are the result of one or more of these etiological conceptions. Among the various surgical treatments, we will mention: (1) injections of medicinal agents into the thyroid body; (2) exothyropexy (this operation has been almost completely abandoned); (3) partial thyroidectomy; (4) ligation of the thyroidal arteries; (5) sympathicectomy.

Since Reverdin, Schiff, Julliard and Kocher drew attention to the serious consequences of total thyroidectomy, that operation is no longer performed, but partial thyroidectomy is performed in its stead. Depending upon the profuse or nodular character of the goiter, either ablation of one lobe or enucleation of the nodules is performed. The authors claim that this operation is not beneficial, and that it entails danger of immediate death, of alarming hemorrhages, and of respiratory accidents. They state that there is no case reported where von Graef's sign disappeared after operation. (This is an error, as the ocular symptoms disappear even if the exophthalmus persists.) They say that in 200 or 300 cases of thyroidectomy, performed for exophthalmic goitre, in only 3 or 4 did the partial exophthalmus disappear. They claim, as late results of partial thyroidectomy, such complications as myxœdema, insanity, and intellectual disturbances may occur. They conclude that partial thyroidectomy is more dangerous than the disease. (We would suggest to the authors that they read an article published by us in SURGERY, GYNECOLOGY AND OBSTETRICS, December, 1907, and they will there see that their statements are not justified by actual facts.) Ligation of the thyroidal arteries. This operation has been performed by Billroth, by Woelfler, Rydygier, and especially by Kocher, on exophthalmic goitre. According to Kocher, the symptoms of this disease are positively due to a hyper-activity of the thyroid body, and in lessening the secretion of this gland one can cure the disease. To avoid the serious consequences of a too complete thyroidectomy, Kocher performs successive interventions at different sittings, performing the successive operations only when he has been able to estimate the results of the previous ones. Some of the surgeons, as Lavisé, ligate the four vessels at one sitting, but as the ligation of the four vessels has been followed by myxœdema, it is better not to practice it. Ligation of the four vessels does not prevent recurrence of the disease.

Sympatheticectomy was practiced in 1896 by Jaboulay; he divided the cervical sympathetic trunks. Jonnesco, a few months after Jaboulay's operation, thinking that simple division was insufficient, resected the superior and middle cervical ganglion with the intermediary portion of the chord. In 1897, Soulié included in his intervention, the resection of the inferior cervical ganglion. The results obtained are inconstant. Complete cures are few, and in some of the cases there has been only an attenuation, more or less marked, of the symptom. Often, at the end of a few months, the symptoms reappear. Operations on the sympathetic are no longer in vogue. Other methods of treatment are: organic therapy, sero-therapy, X-ray therapy, radium therapy. These measures

are employed solely to modify the thyroid body or the sympathetic nervous system. Among the pharmaceutical preparations, salicylate of soda seems to be the most active agent. For the sake of completeness, we should mention hydro-therapy, massage, well adapted regimen, isolation, and psychotherapy.

DOYEN, Paris. In exophthalmic goitre, there is always in some part of the thyroid one or more structurally altered foci. Histologically, changes in the epithelium, in type and in amount, can be demonstrated. Extirpation of the diseased parts of the gland results in an improvement of symptoms, which improvement becomes manifest in five, six, or eight days. In many cases a definite cure is obtained. The operation must be performed rapidly as follows:

I use a transverse incision of the skin, which leaves a barely visible and an easily concealed scar; if there be nodules, I enucleate; if the enlargement is diffuse, I remove all the gland outside of a mass the size of a French walnut. This operation can be performed in from five to six minutes, and gives excellent results. It is the action of the gland that we want to modify, much more than that of the sympathetic system.

Medical treatment gives no results in exophthalmic goitre. I have many cases of exophthalmic goitre in which I have successfully performed partial thyroidectomy. I am satisfied with this operation; when properly performed, it has few dangers and it gives excellent results.

LANCREAUX, Paris. To me, quinine sulphate, in large doses and long continued, is the most serviceable medicinal agent that we possess in the treatment of exophthalmic goitre.

M. S. BALLET. I admit that, at the beginning of Basedow's disease, there is a nervous disturbance interfering with the function of the thyroid body. I must, however, acknowledge that the symptoms of this disease can be determined by the ingestion of thyroid gland, or of its various preparations. Practically, however, we must admit that some of these patients recover spontaneously, and some recover under medicinal treatment. Cases of exophthalmic goitre should be sent to the surgeon only when no improvement follows the employment of proper medicinal measures, and also belonging to the surgeon are those cases associated with grave disturbances.

LEOPOLD LEVI, Paris. Basedow's disease can be produced in men by the ingestion of thyroid gland preparations, and also by iodine treatment of simple goitres.

KOCHER, Bern. I have observed, in exophthalmic goitres, some blood changes and some changes in the lymphoid tissue, that were due to the thyroid disturbance. I have had good results by partial extirpation and by arterial ligation. I have at times performed only one of these operations; at other times I have performed them both, either at one or at successive sittings, in the same case. I am an advocate of operative treatment of this disease.

RÉNON, Paris. I have used pituitary body extract in exopthalmic goitre. I consider it only a symptomatic medication. I have used it to influence the vascular symptoms of exophthalmic goitre.

PARISOT, Paris. I have treated by pituitary body extract, three patients suffering from exophthalmic goitre. In all cases I have had improvement in all the symptoms. I think that we must consider two things; the intense vaso constriction which this hypophyseal extract exerts upon the thyroid vessels, and second, the antitoxic influence of this extract towards thyroid extract.

PAUL SAINTON, Paris. I wish to talk of organotherapy of exophthalmic goitre, its indications and its results. For a long while, exophthalmic goitre was considered a neurosis, pure and simple, the same as neurasthenia, as hysteria. The cause of this affection has also been sought in the sympathetic nervous system, either in its entirety or in its cervical portion. Others have sought the cause in the restiform bodies. It seems, however, that the thyroid theory has gained and is still gaining ground. Some authors have sought to find the cause of exophthalmic goitre in other glands but the thyroid proper. Some, having seen the presence of Basedow's symptom-complex accompanying changes in the ovarian function, such as puberty, menstrual disturbances, etc., have looked upon the ovaries as being the seat of the cause of this disease. Others, having noticed at autopsies of patients dying from this disease the persistence and enlargement of the thymus gland, have looked upon this organ as being the cause of this infection. Some have thought that it was due to the pituitary body; some to the parathyroid bodies. There have been so many cases in which organic therapy has been employed, and there have been so many improvements following its use, that the effects surely are not due to suggestion. However, the problem is still undecided.

We have, as yet, no specific treatment for this disease: therefore hygienic, dietetic, electrotherapic methods of treatment that have given successes should not be entirely abandoned.

MISCELLANEOUS

THE ETIOLOGY OF CANCER OF THE STOMACH IN MAN AND IN ANIMALS. Doyen.

Experiments undertaken to solve the etiology of tumors have been conducted along two distinct channels. First, as to transplantation of the cancer. Ehrlich has shown that the epithelioma of mice, after passing through many successive animals, can be converted into a sarcoma. He has shown that these mice upon whom he was unable to transplant eptheliomata, were vaccinated, or immune against epithelioma, against sarcoma, and against enchondroma. More recently, he has shown the transformation of epithelial cancers into adenomata; that is, by inoculating mice with a malignant tumor he obtained a benign tumor. Researches upon the pathogenic causes of tumors have led me to believe that most varieties of tumors,— epitheliomata, carcinomata, sarcomata, enchondromata, etc.,— contain the same microbe. Experiments have shown that the inoculation of pure cultures, either of epithelial or sarcomatous origin, produce indifferently, and almost always simultaneously, in the white rat, epithelial and cartilaginous neoplasms in the lungs, identical with the malignant enchondromata that are found in dogs' lungs. The experiments of Ehrlich have confirmed fully my early publications: 1. Upon the etiological unity of neoplasms; 2. Upon the possibility of immunizing the organism by a unique vaccine against all tumors, no matter how structurally different they may be. This vaccine treatment can be successful only if it be employed upon first appearance of the symptoms.

INJURIES AND DISEASE OF THE LIVER AND GALL-BLADDER. Borszeky.

Open Wounds of the Liver. In the first case reported, there was a gunshot wound of the liver with an associated perforation of the stomach. The stomach wound was sutured; uneventful recovery followed.

In the second case, there was a stab wound of the liver, with an associated one of the stomach, of the pancreas, and of the renal vein. Death followed, despite the suturing of the liver, of the stomach, and the tamponing of the pancreatic wound. Borszeky advises early intervention in all penetrating wounds of the abdomen. In wounds of the liver, he advises deep sutures. Tamponing is only a measure of necessity and the ingestion of gelatinized serum is of doubtful value. As to the nature of the suturing agent, it has but little influence upon cure. In the case reported above, catgut was employed.

TRAUMATIC RUPTURE OF THE HEPATIC DUCT. Hilderbrandt.

The author reports a case of a young girl, five years old, run over by a wagon. There was laceration of the hepatic duct. Diagnosis was determined by the presence of distension of the abdomen and the absence of biliary pigments in the urine. The hepatic duct was drained and cure was rapid. In a case reported by the author, though the bile was sterile, there was produced an aseptic fibrous peritonitis depending upon the corrosive action of the bile. The author states that no case of septic peritonitis, due to rupture of the biliary ducts has yet been reported.

In all these cases operation must be early.

ONE HUNDRED OPERATIONS UPON THE BILIARY DUCTS AND THEIR LATE RESULTS. Kocher and Matté.

Kocher says it is often difficult to determine, previous to operation, the exact seat of the pathological lesion. In all these cases, he used an oblique incision. It saves the nerves of the rectus abdominus muscle and gives sufficient room.

Ideal cholecystotomy, with closure of the gall-bladder by suture, was practiced 31 times, but only in those cases where the gall-bladder showed no inflammatory adhesions, and in which Kocher was sure that all the gall-stones had been removed. The gall-bladder in these cases was sutured in two layers, one layer of catgut, including all the coats of the gall-bladder and an external layer of silk sutures. Then the abdomen was closed. Cholecystectomy was performed in 30 cases, several times after the gall-bladder has been opened, the abdominal cavity being closed without drainage in nineteen cases. For choledochotomy, retro- or trans-duodenal, Kocher recommends the mobilization of the duodenum. This facilitates the intervention, and never has any disadvantages.

His mortality was 2 per cent. In cases that were drained, the tampon was removed two or three days after the operation. Sixty-nine out of 82 patients were completely cured of their biliary colics. Six have died since, but of a disease totally independent of cholelithiasis, and in only two cases did a post-operative hernia develop. Cholelithiasis recurred three times in 31 ideal cholecystostomies; once in 19 cholecystostomies; and also once in 30 cholecystectomies. Cholecystectomy, in his cases, did not unfavorably influence the digestive functions.

AIMÉ PAUL HEINECK.

REPORT ON 300 TUMORS OF THE BLADDER.

A. v. Frisch details 300 operations for tumor of the urinary bladder. Of this series of cases, 201 were so-called benign papillomata; yet it is interesting to note that a study of serial sections of these 201 benign papillomata disclosed malignant degeneration in over one-half the cases. As a matter of fact, therefore, two-thirds of all the tumors in this series of 300 were malignant. Based on this fact, Frisch recommends that a portion of the bladder mucosa should be removed, even in those cases of well pedunculated tumors. Should the tumor not be pedunculated, then a wide excision of the entire thickness of the bladder wall is recommended. Frisch in his operations has always confined himself to the simple suprapubic operation. Frisch closes the bladder wound with catgut and after partially closing the suprapubic wound, drains through the remaining aperture. He advises against complete closure of the bladder, admitting, however, that such a procedure might be considered rational if the urine be absolutely normal. The mortality of the series of 300 cases was 14 per cent for the papillomata and 25 per cent for the carcinomata — *Wien. Klin. Woch.*, No. 40, 1907. M. G. SEELIG.

TUBERCULOUS SPLENIC CIRRHOSIS. SPLENECTOMY. By X. Delore et Gabourd.

Many operators believe with Quénu and Duval that in Banti's disease, we have an indication for splenectomy. Three splenectomies in the hands of the authors, gave three operative cures.

In hydatid cysts of the spleen, splenectomy ordinarily is preferable to marsupialization, especially if the spleen be studded with cysts. Cases are cited in support.

In one of the cases reported by the author, the cirrhosis of the spleen was associated with a bacillary tuberculous peritonitis. Upon the peritoneum, the tuberculous nature of the lesions was microscopically demonstrated, sections from the spleen, however, showed only hypertrophic cirrhosis, no microscopical suggestion of tuberculosis being present.

In cases of mobile spleen, we think the median-abdominal incision is the best. If the spleen be markedly adherent, an oblique incision, parallel to the lower border of the thoracic cage, to which a vertical incision can if necessary be added, seems the method of choice. In these cases, if the separation of numerous adhesions necessitates drainage, we use a lumbar drain. In some cases where the spleen is solidly fixed to the concavity of the diaphragm, the resection of the inferior border of the thorax facilitates the removal of the spleen.— *Cirrhose hypertrophique tuberculeuse de la rate. Splenectomie. Archives générales de Chirurgie.* 25 janvier, 1908.

ON THE PATHOGENESIS OF CHOLELITHIASIS.

Exner and Heyroosky, by inoculating with various kinds of bacteria, bouillon in which was dissolved sodium tanrocholate and glycocholate, determined that there was a decomposition of the biliary salts. Of these bacteria, (streptococcus, staphylococcus aureus, Friedlander's bacillus, bact. coli.—bac. pyocaneus, bac. proteus, typhoid bacillus) although all decomposed the biliary salts, by far the most active was the typhoid bacillus. From these experiments, they conclude certain bacteria precipitate the biliary constituents and bring about the formation of gall-stones. They also conclude that because of the slight destructive action, the streptococcus plays no rôle in the etiology of gall-stone formation.— *Wien. klin. Wchnschr.*, 1908. Feb. 13.

C. G. GRULEE.

GOITRES AND STRUMITIS. By Xavier Delore and Andrè Chalier.

These authors report and analyze 73 cases of operatively treated benign enlargements of the thyroid gland, inflammatory or neoplastic in nature. They have not considered primary exophthalmic goitres, nor malignant tumors of the thyroid gland, nor any form of goitre that proved amenable to medicinal measures. They had one death.

Most of their simple goitres occurred in female patients. In nearly half of the cystic goitres, the cyst contents contained blood elements or their derivatives. In some of these cases the intracystic hemorrhage is acute, producing a marked increase in the volume of the cyst, and the rapid appearance of functional disturbances. The cyst walls show no special anatomical changes. More commonly, however, the effusion occurs gradually; as in pachy-vaginalitis, we are dealing here with a torpid inflammatory process, causing a proliferation and thickening of the cyst wall, and the production of an hemorrhagic exudate. The intracystic fluid in these cases is characteristic, having a blackish aspect and chocolate hue. The cases belonging to the first type may be called acute thyroidal hæmatoceles; those belonging to the second type, sub-acute or chronic thyroidal hæmatoceles. These thyroidal hæmatoceles may cause compression disturbances, may become the seat of infection, of suppuration. Cases are reported to show that psychical disturbances, even insanity as well as the symptom-complex of Basedow's disease, can develop in the course of the existence of simple goitre. The correlation of these morbid

phenomena to thyroid changes is demonstrated by the fact that they are either improved or completely cured by operative treatment of the goitre.

The existence of diver goitre, a goitre which is very movable and situated either below or above the sternal notch, depending upon the motions of respiration, must be kept in mind. Of these there are two forms, the cervical and the intrathoracic. The latter are difficult to diagnose and difficult to operate. Nevertheless their diagnosis is important, as the disturbances to which intrathoracic goitres give origin can be completely controlled by the removal of the goitre. A case in point is reported. A painter remained for a long time in the medical ward for œdema of both lower limbs associated with dyspnæa and albuminuria. The diagnosis of lead nephritis was made. Only when symptoms of unilateral paralysis of the recurrent laryngeal nerve became manifest was the diagnosis of intra-thoracic goitre made. The patient was 61 years of age and in bad physical condition. Nevertheless, it was decided to operate, and the goitre was removed. Shortly after the œdema, the albuminuria, and the symptoms referable to the recurrent laryngeal nerve disappeared. Cardiac disturbances are frequently engendered by this form of goitre.

Operate: *a*. In all cases where the goitre by compressing neighboring organs interferes with the normal function of organs; be the goitre large or small, retrosternal, or fibrous, or cystic.

b. In all cases in which the goitre causes nervous or psychical disturbances.

c. Even if the goitre does not cause compression disturbances, these authors favor operative intervention. The operation of the removal of the goitre is benign; it prevents the possible development of hemorrhages and inflammation in the goitre, as well as malignant or cancerous degeneration of the same. In children and in adolescents, before resorting to surgical treatment, medical measures (iodothyrine, iodized applications, etc.) must be tried.

The injection treatment of goitre is condemned. Exothyopexy can be of service as an emergency operation. To resection or partial thyroidectomy, they prefer enucleation, either massive or intraglandular. It is an inter-capsular operation and avoids the infliction of injury to the recurrent laryngeal nerves, or to the large thyroidal vessels. Socin's operation is of service in adenomata.

Kocher's transverse incision is the one they most always use. The infra-hyoid muscles are separated when possible. If, of necessity, they must be divided, suture them at the close of the operation.

Always employ drainage. It prevents the development of hæmatomata, and often the development of infection. It prevents the accumulation of thyroid secretion in the wound. This secretion can, if absorbed, cause very alarming and at times fatal accidents.

Local or general anæsthesia may be used, the choice being determined by the same rules that influence the choice of anæsthetic agents in other operations. They personally prefer ether preceded by ethylchloride (10 cc.).

Twelve cases of thyroiditis and strumitis are reported. The authors state that suppurative inflammation occurs more frequently in goitres than in the normal thyroid gland. They treat these cases by a free incision associated with drainage. In some cases, they remove the wall of the abscess. All their cases recovered.—*Contribution a la Chirurgie thyroidienne Goîtres et strumites. Revue de Chirurgie*, Paris, vol. xxvii, Oct. 10, 1907. AMIÉ PAUL HEINECK.

PRIMARY CARCINOMA OF THE BLADDER. By Benjamin H. Brown, M.D., Chicago.

The author in this communication reports a series of ten cases of primary carcinoma of the bladder from the records and specimens in the pathological laboratory of the Rush Medical College. The report is based primarily upon post-mortem examinations, supplemented in each case by a careful microscopic examination, and as far as possible, by the clinical data.

In regard to the prevailing seat of the tumors, statistics concerning which the author finds very contradictory, it was definitely determined in this series that in three instances the primary seat was in the trigone. In three other cases the tumors showed greatest involvement of the upper part of the bladder, while the remainder affected the middle zone more extensively. The urethra was directly involved in the tumor mass in two instances, while in two there was partial obstruction by projection portions of the neoplasma. One or both ureteral orifices were directly implicated in three cases, while in four others there was partial obstruction by pressure of the tumor or nodules. One tumor had invaded both seminal vesicles. None of the growths had extended to the prostate or rectum, and only one had caused perforation into the peritoneal cavity.

In three cases of the series no metastases or extravesical involvement was found, while in six others metastases were present in various organs, as follows: Four times each in the retroperitoneal glands and lungs; twice in bones, and once each in the peribronchial glands, inguinal glands, adrenal glands, kidney and testicle.

From this study the following conclusions are drawn by the author:

1. Intelligent deductions and trustworthy statistics are to be derived only from careful and thorough study of a large number of cases from both clinical and anatomical sides. 2. The most frequent seat of carcinoma in the bladder and the direction of extension are still debatable questions. 3. Metastasis is much more frequent than is conceded by many clinicians. 4. A malignant growth in the bones may occur from a primary carcinoma of the urinary bladder. 5. The most frequent cause of death in vesical carcinoma is a secondary infection of the ascending urinary tract. 6. The diagnosis is always difficult, especially after the onset of complications.— *American Jour. Med. Sciences*, vol. 134, 1907. GEORGE E. BEILBY.

RUPTURE OF THE KIDNEY, WITH REMARKS UPON CONSERVATIVE OPERATIVE TREATMENT. By Thomas R. Nelson, M.D.

Nelson in this contribution places upon record four cases of sub-parietal injury of the kidney which he treated by conservative measures, and considers the question of the employment of such means rather than the radical one of nephrectomy, when possible, in the treatment of this class of injuries. The author's treatment consisted in lumbar incision and gauze tamponade of the lacerated kidney. In two of the cases, with laceration of the peritoneum and severe hemorrhage into the abdominal cavity, laparotomy was also required. Of the four cases treated, three recovered and one died of secondary hemorrhage after removal of the gauze.

The author reviews the literature of the subject of renal injuries with the object in view of ascertaining the results of surgical treatment of rupture of the kidney by packing drainage, or suture of the renal wound, as compared with those of nephrectomy, and of determining the limitations within which conservative treatment may properly be employed.

While it is obvious that comparative statistics may be deceptive, since the results of injuries vary so in extent, yet it seems certain from the author's collected cases that conservative measures should be employed where the hemorrhage can thus be controlled, and where the vitality of the kidney is not threatened beyond reasonable hope. — *American Journal of the Medical Sciences*, vol. 135, 1908. GEORGE E. BEILBY.

OBSERVATION ON SIX CASES OF ACUTE PERFORATING ULCER OF THE DUODENUM. By E. A. Codman, M.D.

The experience of the author with this condition has led him to the conclusion that it is of far more frequent occurrence than is usually considered. This is due to the fact that cases of acute perforating ulcer so closely simulate appendicitis that they usually come to operation with this diagnosis, and unless the condition of the appendix is carefully investigated, the postoperative diagnosis is not revised. The peritonitis following the duodenal perforation, involves often the appendix and the latter is removed under the erroneous impression that it was the primary seat of the infection. He emphasizes the importance of examining carefully the mucosa as well as the peritoneal coat of the appendix on its removal, unless perforation or gangrene is obvious. He cites several points which in severe cases would suggest duodenal ulcer rather than appendicitis:

1. Onset of pain more sudden and violent and more initial shock.

2. A contracted concave, boardlike abdomen. This he believes very characteristic though some cases of appendicitis have it too.

3. Tympany over the normal area of liver dullness. This is by no means the rule, but when present is almost diagnostic. Gas may not always be noticed when the peritoneum is opened.

4. The vague symptoms of duodenal ulcer elicited by careful questioning.

5. Most of the patients are males between twenty and forty years.

6. Location of pain and tenderness is very deceptive. The technique of dealing with these cases is discussed fully.— *Boston Medical and Surgical Jour.*, vol. 158, Feb. 13, 1908

GEORGE E. BEILBY.

THE TREATMENT OF ACUTE INFECTIONS (PURULENT) BY MEANS OF STASIS HYPERÆMIA.

L. Wrede, who is an assistant of Professor Lexer, offers the most painstaking and carefully studied brief against Bier's hyperæmia. He does not assume that stasis hyperæmia has no place in surgical therapy, but takes the ground that many of Professor Bier's statements are not corroborated by facts; and furthermore, that, under certain conditions, the induction of hyperæmia may work harm for the patient.

The paper starts off with a theoretical discussion of Bier's theory. Wrede objects to the autocratic statement that venous congestion and a slow blood stream are, of necessity, Nature's means of combating acute infections. Clinical experience has not yet definitely proved that stasis hyperæmia possesses either a bactericidal power or the power of diminishing the virulence of bacteria. Moreover, Wrede contends that Bier's method causes a

rapid absorption of toxic material, which not seldom results in deleterious action on the viscera. Bier's teaching that small incisions are better than than large ones is little short of heresy, according to Wrede; and Bier s explanation that "stasis hyperæmia accomplishes good results by means of hyperæmia" is little short of foolish.

From a practical point of view, Bier's method is of service only in cases of very mild infection, and in these cases, as a matter of fact, cures can be accomplished just as readily by methods in common use before Bier's time. Some patients with severe infections have fared so badly under the use of hyperæmia that major amputations, and even death have resulted, due to a generalized sepsis. All in all, Wrede thinks that Bier's fundamental theory that "inflammation is a useful process" is falsely conceived.

The article is, covertly, too polemic in character to be of unquestioned scientific value, and yet it stands as the most serious attempt to controvert the work of Bier and his school.— *Arch. f. Klin. Chir.*, b. lxxxiv, h. 2, and 3.

M. G. SEELIG.

A CLINICAL-EXPERIMENTAL STUDY OF THE QUESTION OF ACUTE DILATATION OF THE STOMACH. By W. Braun and H. Seidel.

Concerning the origin of acute stomach dilatation, which occurs especially after laparotomies, the authors recognize the fact that there is great difference of opinion. Three modes of origin are recognized. 1. Closure of the cardia by a valve-like formation at the entrance of œsophagus into stomach. 2. Injury to the duodenum by descent of the small intestine into the pelvis, thus producing traction on the mesentary that passes over the duodenum: *An artero-mesenteric obstruction.* 3. Through central nervous influences.

Autopsies as well as experiments on live dogs, the personal observations of the authors and a critical study of the literature led these investigators to the conclusion that not mechanical but purely functional disturbances of the stomach play the leading rôle in the etiology of acute stomach dilatation. In part these disturbances of the stomach innervation are central, peripheral, or reflex in their nature; in part they are disturbances of the musculature itself. The acceptance of innervation disturbances as the etiologic factor explains the acute dilatation after anæsthetics, laparotomy, hernia and other injuries, spinal cord injuries, peritoneal infections, constitutional and other diseases. Direct injuries to the muscular fibres come through mechanical, inflammatory or toxic injuries of the same, perhaps on account of a primary weakness, brought on by overdistention, peritonitis, toxæmia or gastric fermentation. In consequence of the disturbed gastric movements, there is soon an accumulation of ingested food and gastric secretion; then decomposition sets in and the stomach becomes acutely dilated.

The author's experiments on dogs were performed after the establishment of gastric fistula. As a measure of the effect which the experiments had on the emptying mechanism of the stomach, the animals were made to vomit under various stimuli, e. g., by blowing air into stomach through the fistula, by the administration of tartar emetic or apomorphine. The experiments demonstrated that narcosis, as well as division of the vagi, the splanchnic, the sympathetic or the upper part of the spinal cord, prohibited the stomach from emptying itself through vomiting.

Finally, the authors discuss the clinical picture of the disease and the course of acute dilatation of the stomach in man. Washing out the stomach they believe to be the most important measure both in the prevention and relief of the condition, while operation, gastroenterostomy or jejunostomy, should very seldom be considered.— *Mitteilungen aus den Grenzgebeiten der Medizin n. Chirurgie*, bd. xvii, h. 5.

GEORGE E. BEILBY.

VALUE OF THE DIFFERENTIAL LEUCOCYTE, COUNT IN ACUTE APPENDICITIS. By Alfred H. Noehren, M.D.

Data on 72 cases of appendicitis revealed the fact that differential count of leucocyte may be of great value to the surgeon. Ninty per cent of polynuclears indicate immediate operation. The lower the per cent of polynuclear cells the less severe is the condition. The degree of leucocytosis is too variable to be of practical value.— *Annals of Surgery*, February, 1908.

WM. R. CUBBINS.

POSTOPERATIVE X-RAY TREATMENT OF MALIGNANT DISEASE. By. Russel H. Boggs, M.D.

X-ray treatment was found to be very beneficial when applied properly. The glands undergo fibrous change. More favorable results are obtained in carcinoma than in sarcoma, on account of the difficulty in determining its virulency.— *Annals of Surgery*, February 1, 1908.

WM. R. CUBBINS.

CONSIDERATIONS ON THE ETIOLOGY AND ORIGIN OF HERNIAS. By P. Berger.

From the medico-legal standpoint, the question of hernia is most complex. Many hernias which are said to be due to an effort, to a strain, are in

reality hernias due to weakness dependent on a congenital malformation. (P. Brouardel).

An individual bearing a hernia due to an accident, must either be provided with a truss or subjected early to an operation for radical cure. If he be provided with a truss, incapacity for work ceases and consolidation must be considered as acquired after the hernia has been contained and is maintained by bandage deemed sufficient.

If the operation for radical cure be performed, consolidation must be dated from the time when the patient can, without undue caution, resume his calling. That is usually three months after the operation. It is needless to say that if the operation for radical cure has been well performed, especially if it has been performed for a recent hernia, no bandage or appartus must be worn after the union of the operative wound is complete.

Thus, in a hernia occurring during work, consolidation of the wound must be dated from the time the subject of the hernia has been provided with a well-fitting truss. After an operation for radical cure, the consolidation of the hernia must be dated three months after the date of operation. It takes, however, from eight to ten months more to be able to judge of the distal results of the operation and of the validity of the cure obtained by the latter.— *Les hernias et les accidents du travail. Considérations sur l'etiologie et sur les origines des hernies. Revue de chirurgie*, 1906.

Doménichini (Clinica chirurgica, août 1907) is of the opinion that once a workman has been operated upon for an inguinal hernia, he is entitled to no further indemnity.

Causes of Recurrence After Radical Cure of Inguinal Hernias. Femoral Hernias Developing After the Cure of an Inguinal Hernia. By P. Berger.

Among the causes of recurrence may be mentioned defective technique. In a good operation for radical cure, the anterior wall of the inguinal canal must be widely opened. There must be a high resection of the hernial sac. All omentum present in the hernial sac must have been removed. The posterior wall of the inguinal canal must be rebuilt and its normal obliquity restored. The removal of masses of adipose tissue and of varicose spermatic veins is a valuable step. In rebuilding of the posterior wall, the sutures must be so united as to secure good approximation of the lower order of interior obliquity of the transversalis muscle in order to shorten Poupart's ligament.

Cure is difficult in large hernias, due to the gliding down of the large intestines. In Bassini's operation, Poupart's ligament is elevated. From that elevation of Poupart's ligament results an enlargement at times of the crural canal. This is especially liable to occur if there be weak abdominal walls. It is well to avoid this elevation of Poupart's ligament. It is better in these cases to lower and suture a portion of the rectus abdominis muscle to Poupart's ligament; or, to suture first Poupart's ligament to Cooper's ligament and then to perform a radical cure for hernia and follow this by covering the whole with a portion of the pectineus adductor muscle.— *Les causes de récidives á la suite de la cure radicale des hernies inguinales. Hernies crurales qui se développent à la suite de la guerison d'une hernie inguinale. Bulletin médical, 7 décembre*, 1907.

Intercostal Abdominal Hernia. By P. Alquier.

Intercostal abdominal hernia is an uncommon affection. It is always of traumatic origin. It always occurs on the left side of the body, and at the level of the 6th, 7th, 8th, 9th, and 10th intercostal spaces. It usually occupies the anterior extremity of these spaces. Though it usually does not involve the pleural cul-de-sac, an abdominal intercostal hernia may under certain conditions develop through the pleural cul-de-sac. These hernias do not possess a sac. Their contents are frequently adherent to the deep layers of the skin. Clinically, we have the signs common to all hernias, and pain and digestive disturbances may be very marked. Its infrequency may cause its oversight. Radiography may be of much usefulness in determining the contents of the hernia and in fixing its relation to the pleural cul-de-sac. The operation may be difficult owing to adhesions of the hernial contents, owing to the narrowness of the operative field and to difficulties which may be associated with the parietal orifices.— *Hernie intercostale abdominale. Archives générales de Chirurgie*, 25 janvier, 1908.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M. D. — E. C. Dudley, M. D.
J. C. Hollister, M. D. — F. W. Lynch, M. D.
Gerry R. Holden, M. D. — Carey Culbertson, M. D.

The Round Ligament in Femoral Hernias. By Chevrier.

The round ligament is frequently in contact with the sac of the femoral hernia. Anatomically it is just behind the secondary depression. If it is not seen during the course of the operation, it is because in the dissection of the sac it is pushed aside. In the ordinary femoral hernias, the round ligament may occupy three different situations: It may be adherent to the peritoneum, posterior to the sac; second, it may be detached from the peritoneum and adherent to the top surface of the neck of the sac, and may be temporarily adherent; third, it may pass over the fundus of the sac and determine the strangulation of the fatty tissues which surround the sac.

The prolapse of the round ligament is an etiological factor in the production of femoral hernias containing any of the internal genitalia. The most common content of these congenital crural hernias is either a portion or a whole of the Fallopian tube. — *Le ligament rond dans les hernies crurales. Revue de chirurgie*, février, 1907.

Aimé Paul Heineck.

Postoperative Occlusions. By J. L. David.

The existence of intestinal occlusion, due to spasm is yet to be demonstrated. As to the paralytic form of intestinal occlusion, it is not possible for us to separate it from the peritonitis which accompanies it. The phenomena of postoperative intestinal paralysis, we believe, are always due to peritoneal infection, grave or severe; excluding the above as well as the postoperative intestinal occlusions due to some operative error, postoperative occlusions can be classified into three groups: 1. Occlusion of bands. 2. Occlusion by adhesions, and 3. Occlusions due to vicious position.

There is one cause of intestinal occlusion, due to vicious position, which has not been very much studied. That cause is the Trendelenburg position. Its mechanism is easy to understand.

The change from the inverted reclining posture, in which the transverse colon and the coils of the small intestine have gravitated towards the diaphragm, to the horizontal posture, suffices in certain cases to produce a twist or an angulation of the intestine. Kraske has reported two such cases; but more frequently another factor intervenes — it is intestinal decompression, it is abdominal vacuity.

After the ablation of a large tumor,— of an ovarian cyst, for instance,— the intestine is too free in the abdominal cavity and easily displaces itself. These movements of exaggerated amplitude may lead to torsion, to angulation.

It is difficult early to diagnose these postoperative occlusions, because their development is so insidious and because they are masked by the inhibitory phenomena which we are accustomed to witness after laparotomies. The repeated vomiting is attributed to the anæsthetic. The abdominal pain is attributed to the hypersensitiveness of the patient. One hesitates, time flies, and it is soon too late and one regrets not having taken a bold decision while the patient could still be saved.

Preventive measures must not be ignored. Denuded surfaces must be covered with peritoneum; stumps must be buried; and inflamed portions of the omentum must be resected. The patient must be returned to the horizontal position before beginning the suturing of the abdominal walls. Satisfy yourself that the intestinal coils are in a good position before completely closing the abdominal wound.— *Occlusions post-opératoires. Tribune médicale, Archives générales de Chirurgie*, janvier, 1908.

Intestinal Occlusion: Cause and Mechanism of Accidents. By Roger.

Of the various theories advanced to explain the accidents secondary to intestinal occlusion, the three that most deserve to be kept in mind are, the nervous theory, the toxic theory, and the infections

theory. They, however, do not sufficiently explain the observed phenomena.

Basing his opinions upon experimental researches, Roger claims that the accidents of intestinal occlusions are due to an auto-intoxication of the organism. The intestinal contents, in fact, are toxic and their toxity is due to the glandular secretions of the digestive system. If an obstacle determines the stagnation of the intestinal contents, that of itself causes a disturbance or an arrest of secretory activity of the various glands; for instance, of the intestinal, of the hepatic and of the pancreatic glands, the products of which are emptied into the upper portion of the digestive tube. Most of the secretory liquids are emptied into the upper portion of the digestive tube, and herein lies the explanation of the fact that the accidents are more early and more serious the higher the seat of intestinal obstruction. If the seat of obstruction be in the lower part of the small intestine or in the large intestine, death is notably retarded.

Roger has determined also, that the extracts prepared from the intestinal coats are toxic, convulsant and hypotensive. He claims that there is a syndrome of gastro-intestinal insufficiency just as there is a syndrome of hepatic insufficiency (grave icterus), a syndrome of renal insufficiency (uremia) a syndrome of thyroid insufficiency and one of adrenal insufficiency. Why refuse to the digestive tract that which we accord to other parts of the organism? — *L'occlusion intestinale cause et mécanisme des accidents. Revue scientifique*, janvier, 1907. AIMÉ PAUL HEINECK.

ADVANCED BROAD-LIGAMENT PREGNANCY. By Ralph Waldo Lobenstine.

Rupture of the ectopic sac into the space between the layers of the broad ligament is rare, while advanced cases are very unusual. In typical cases the leaves of the broad ligament are stripped back so as to leave a sessile tumor. In other cases, a more or less pedunculated tumor may be formed. The placenta may occupy any portion of the wall of the sac. The sac may rupture into the peritoneal cavity at any time, thus forming a "secondary abdominal pregnancy."

Lobenstine reports one case of advanced broad-ligament pregnancy. When first seen the patient was in very bad condition, the clinical picture being more that of a large ovarian cyst, with beginning peritonitis than that of an ectopic gestation. There had been no menstrual period for 8½ months.

At operation, 24 hours later, it was found that the posterior layer of the left broad ligament had been stripped up and backwards by the pregnancy. There was a very large tumor formed. The placenta, which was in the bottom of the cavity behind the uterus, had become detached, causing free bleeding into the sac and death of the child. Ten quarts of bloody fluid was removed from the sac before the child was extracted. After removing child and placenta there was little oozing, but the patient was too seriously ill to survive the operation more than a few days.— *Bulletin of The Lying-In Hospital of the City of New York*, vol. iv, No. 2, 1907. GERRY R. HOLDEN.

TUMORS OF THE OVARY COMPLICATING PREGNANCY AND LABOR. By Ralph Waldo Lobenstine.

Lobenstine reviews the literature on the subject and then gives the histories of 9 cases which occurred in 42,000 labors at the Lying-In-Hospital, New York City. His conclusions as to treatment are as follows: In as much as the maternal mortality of cases during pregnancy ranges between 20 per cent and 25 per cent when no operation is performed as against 3 per cent to 5 per cent in operative cases, operation should always be done as soon as the diagnosis is made.

If the tumor does not descend into the pelvis during labor it requires no treatment at this time. If the tumor is found to lie in the pelvis at the time of labor, we should endeavor to push it up gently into the false pelvis. If this cannot be done and the child is alive, we may perform a vaginal ovariotomy with subsequent delivery of the child, or a Cæsarean section with ovariotomy, or an abdominal ovariotomy, with delivery "per vaginam." If, however, the tumor descends into the pelvis during labor and the child is dead, it may be possible to do a craniotomy and extraction. In some of these cases, however, ovariotomy must be first performed.

In case the tumor was not removed either during the pregnancy or labor, it is very likely to give trouble in the early puerperium. Therefore, operation soon after delivery is indicated in such cases.— *Bulletin of The Lying-in Hospital of the City of New York*, vol. iv, No. 2, September, '07.
GERRY R. HOLDEN.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Rudolph W. Holmes, M. D.
C. v. Bachellé, M. D. — Hugo Ehrenfest, M. D.

The Etiology of Puerperal Retroflexions. By R. Olshausen.

Retroflexions occurring during the puerperium result invariably from a perimetritis or a parametritis; and, as a rule, they are the result of the puerperal changes in the genital organs. Olshausen believes that these retroflexions, generally if not always, occur in the first puerperium and not during the later ones; and indeed, this has been the case in his own experience. Curiously enough, one finds no mention of this fact in the literature. Its importance in the way of prophylaxis cannot be over estimated.

Küstner has said that puerperal retroflexion is very frequently followed, secondarily, by a pelvic peritonitis; but Olshausen can not entirely agree with this, for he believes it to be only a very occasional occurrence. The retroflexion occurring during the puerperium, unless complicated by an inflammatory process, is always mobile. However, the occurrence of para- or peri-metritis calls forth complications.

As to etiology, Küstner believes that the retroflexion had previouslv existed in the girl and that the uterus merely returned to the faulty position after the delivery. This theory Olshausen does not accept because of the frequency of the retroversion of the puerperium as compared with the comparative infrequency of the retroversion in the virgin. He believes the anatomical conditions, present in the later pregnancies, differ enough from the conditions in the first pregnancy to account for the position of the uterus. In the latter part of pregnancy, the head enters the inlet of the pelvis, projecting pretty well into the pelvic cavity and this results in a marked thinning of the cervix from the pressure and stretching, in fact so much so, that at this time one can easily palpate the sutures of the fetal skull through the cervical wall. Such a cervix easily forms folds in its walls during the puerpium. This condition does not recur in succeeding pregnancies. During the labor, the cervix is thinned still more and its canal often stretched to a length of 10 cm. It is this thinning and stretching of the cervical wall that he firmly believes is the most important factor in the production of these displacements. It is apparent that the anterior wall is subjected to the greatest amount of thinning and elongation; and, therefore, one would expect anteflexion to occur more easily and, as a matter of fact, it does. The development of a permanent abnormal anteflexion is prevented by the regular and repeated distension of the bladder.

Less frequently anteflexion does not occur but retroflexion appears. It is possible that the position of the patient on her back in bed during the puerperium favors the production of the malposition, or that over-distension of the bladder or intestines, which so often occurs, tends to displace the uterus. The fact remains that the malposition occurs very frequently during the first puerperium; and, therefore, it is the duty of the obstetrician, about four or five weeks post partum, to make a careful examination of his patient and bimanually to replace the uterus if retroflexed, repeated if necessary and if this is unavailing to have the patient wear a pessary for the time. In recent cases such treatment is very effectual. Occasionally the condition can be found as early as eight days after labor, especially in miscarriages, but usually the retroversion first appears in the third or fourth week of the puerperium.— *Zentralblatt f. Gyn.*, No. 1, 1908. *Zur Ätiologie der Retroflexio uteri Puerperalis.* C. v. Bachellé.

The Healing of Hebosteotomy Wounds. By Dr. Oberndorfer.

The hebosteotomy in the case reported occurred in a VIII para, aged 36, whose children had all been prematurely born or else were very small. In this instance the pregnancy was prolonged 3 to 4 weeks over term and hebosteotomy was done and the patient delivered of a nine pound child. The puerperium was normal and uneventful, except for an hematoma of the right labium,

which attained the size of a hen's egg but which was rapidly absorbed. In three weeks the patient was able to be about, though limping somewhat. This, however, disappeared later on. At this time a sharp edged cleft, about 1 cm. wide, could be felt at the site of the bone incision; later this was scarcely perceptible. Fourteen months later, the woman died from an intercurrent affection and at autopsy, the pubic bone was removed and the site of the hebosteotomy was examined histologically, when it was found that there was no sign of ossification and only fibrous union had occurred, with cartilaginous edges. The literature, too, he believes, bears out his statement that in nearly all cases only fibrous union occurs; and this, he thinks, is due to the fact that the smooth sawcut does not favor union. Meyer's experiment, in which a pelvic fracture was made on one side and hebosteotomy on the other, with prompt healing of the fracture and no bony union on the cut side, also confirms his belief. Ossification of the fracture was partly facilitated by the spicules of bone partially bridging over the gap. These, of course, were absent in the smooth sawcut and the connective tissue which forms, seems to be an obstacle to the development of bony tissue. Therefore, he says that this fact must be taken into consideration in the future, namely, that in practically all cases fibrous union occurs; but, as to how much softening and consequent widening of the pelvis may occur at a subsequent pregnancy, he does not care to express an opinion.— *Zur Frage der Heilung der Hebosteotomie Wunde. Zentralblatt f. Gyn.*, No. 7, 1908. C. V. BACHELLÉ.

THE ACTION OF HYDRASTIS AND COTARNIN PREPARATIONS UPON THE UTERUS AND UPON BLOOD PRESSURE. By E. Kehrer.

As the result of his elaborate experiment, Kehrer has drawn the following conclusions:

1. Automatic contractions of the uterine muscle are excited by hydrastis and ergot preparations even though the uterine nerves are absolutely cut off.

2. Ext. hydrastis canadensis has the least action of all the hydrastis preparations, while hydrastin and hydrastinin are much stronger.

3. Styptol and stypticin, ergot preparations, have a stronger action under the same circumstances.

4. Hydrastin, hydrastinin, styptol and stypticin have a perceptible action in a dilution of 1–200,000, and therefore these preparations have practically about the same value.

5. This action occurs in all stages of development of the uterine muscle, from birth on through all stages of pregnancy.

6. Berberin and berberinin have no action on the uterus.

7. In the case of intravenous, intramuscular or subcutaneous injection of these preparations, the action was similar to that described above. No sedative action could be determined for any of the ergot preparations, as is claimed by some who recommend their use in uterine hemorrhage during pregnancy.

8. All these cause a temporary cardiac depression followed by a moderate increase in blood pressure due to their action directly upon the blood-vessel.

9. Uterine muscular contractions follow independently of blood-vessel contraction.

10. The complete resemblance between ergot, hydrastis and cotarnin preparations speaks against the use of the last two in hemorrhage during pregnancy.— *Die Wirkung der Hydrastis und Cotarnin Präparate auf Uterus und Blutdruck. Monatsschrift f. Geb. und Gyn.*, bd. xxvi, h. 5.

C. V. BACHELLÉ.

PLACENTA PRÆVIA IN GENERAL PRACTICE. By Johannes Futh.

From statistics obtained from midwives Futh gives a rather complete report on 726 cases of placenta prævia. In 137 of these cases delivery took place spontaneously, version was required in 484 cases, extraction in 42 cases, forceps in 23 cases, and perforation was resorted to once. The metreurynter was used a few times, and the membranes were ruptured three times. The total mortality was 19.7 per cent., 143 women dying. Of these, 12 died before delivery, 9 during, and 122 after labor. Hemorrhage, or its results was the cause of death in 98 cases, sepsis in 31, and rupture of the uterus in 2 cases. No tampon was applied in 90 cases, 6 of which proved fatal, 4 of hemorrhage, 2 of fever. The tampon was used in 96 cases, in 16 of which the patient died, 13 of hemorrhage, 3 of sepsis. Futh argues from this that, while expectant treatment may be preferred in hospital practice, in private practice immediate delivery is safer than tamponing. He has applied this deduction to 10 of his own private cases with invariably good results for the mother. — *Zur Behandlung der Placenta praevia in der allgemeinen Praxis. Zentralb. für Gynäk.*, No. 12, 1907.

CAREY CULBERTSON.

BOOK REVIEWS

A TEXT-BOOK OF MODERN OTOLOGY. By John F. Barnhill, M.D., Professor of Otology, Laryngology, and Rhinology, and Ernest deW. Wales, M.D., Associate Professor of Otology, Laryngology, and Rhinology, State College of Physicians and Surgeons, Indianapolis. Octavo of 600 pages, with 300 original illustrations. W. B. Saunders Company, Publishers.

This is an exception to most text-books, in as much as it brings the subject discussed down to date. This is especially necessary in a work designed for students and practitioners, as the specialist does not depend upon text-books for his keeping abreast of the progress in his individual field. Particularly in Otology is there need of a modern work, as this specialty has advanced rapidly in the last decade. It is high time that chronic suppurative aural discharge should be regarded as dangerous for the patient as chronic appendicitis. Especially that the operative procedures are now worked out with most happy results.

This is the distinguishing feature of this book. The consideration in detail of the suppurative diseases of the ear and its complications is particularly complete.

Preliminary to this are three chapters by Dr. Wales on the anatomy of the temporal bone, physiology of the organ of hearing, and bacteriology of the ear. These cover seventy-eight pages and are concise and yet complete and are well illustrated with original and well-selected cuts. There are no surgical procedures that require a more accurate and perfect acquaintance with regional anatomy than those on the temporal bone, and lack of which leads to such dire results.

Perhaps too little space is given to consideration of the tuning forks, as without them it is impossible to deal with the differential diagnosis of those cases of deafness without suppuration. Also the surgery of the labyrinth is lacking in detail. This phase of aural surgery is still in development, but already a definite technique exists and should be given in a work of this size.

The simple and radical mastoid operations are especially well described and should prove a good guide for the general surgeon who is called upon to do these operations. The fact that in early childhood the relations of antrum and tympanum are somewhat different than in adults should be accented and thus complete the variations of the usual procedures.

The work, as a whole, is excellent and is what its title claims for it.

F. GURNEY STUBBS.

A TEXT-BOOK OF THE PRACTICE OF MEDICINE. By James M. Anders, M.D., Ph.D., LL.D. Professor of Medicine and Clinical Medicine at the Medico-Chirurgical College; Physician to the Medico-Chirurgical Hospital; Formerly Physician to the Philadelphia and to the Protestant Episcopal Hospitals, Philadelphia; Fellow of the College of Physicians; Member of the Academy of National Sciences, Philadelphia, Etc. Eighth Edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company, 1907.

This volume is a well-digested presentation of the subject-matter of Internal Medicine, thoroughly revised to the present time, and well suited to be placed in the hands of students. It is a neat, compact, and well-arranged volume, clearly written, and well-indexed.

In those diseases to which recent additions to our knowledge have been made, the subjects have been entirely re-written, notably the Animal Parasitic Diseases, Aplastic Anæmia, Polycythæmia and Cyanosis with Splenic Tumor, and Stokes-Adams Disease.

A criticism which to the mind of the reviewer applies to most text-books of Medicine, and to which the present volume is no exception, is that in attempting to be logical, and clear in subdividing the subjects, the pathology of the various diseases is considered independently of the clinical manifestations, thus gaining clearness in the subdividing of the subject, but losing a great opportunity in using the pathology to explain the clinical manifestations in the description of the diseases. The idea should be to present living pathology, with its manifestations in the order of their development, and to allow dead-house pathology to assume an inferior station.

CHAS. A. ELLIOTT.

A SHORT PRACTICE OF GYNECOLOGY. By Henry Jellett, B.A., M.D., B.Ch., B.A.O. (Dublin University) F.R.C.P.I. Third edition, revised and enlarged. With 310 illustrations. London:

J. & A. Churchill; Philadelphia: P. Blakiston's Son & Co.; price, $5.00, net.

As stated in the third edition of this work, the present edition of A Short Practice of Gynecology has been submitted to a careful revision throughout, so as to make it represent, as far as possible in a book of the size, the present state of gynecological practice. In particular, the chapters dealing with operations have been largely rewritten, and much new matter added to them. The publishers have added much to the interest of the book by including a large number of new illustrations. As stated by the author, it is impossible satisfactorily to describe gynecological operations without the help of illustrations. A number of the old illustrations have been withdrawn.

The book consists of chapters on the Diagnosis of Gynecological Cases, Menstruation and its Disorders, Diseases of the Bladder and Urethra, Diseases of the Vulva and Perineum, Diseases of the Vagina, Diseases of the Uterus, Diseases of the Fallopian Tubes, Diseases of the Ovaries, Diseases of the Pelvic Peritoneum and of the Uterine Ligaments, Traumata of the Genital Organs, Genital Atresia, Internal Hemorrhage of Genital Origin, Gynecological Operations, Celiotomy, Operations on the Urethra and Bladder, Operations on the Vulva, Perineum and Vagina, Minor Operations of the Uterus, Major Operations on the Uterus, Operations on the Tubes and Ovaries, Operations on the Uterine Ligaments and Pelvic Peritoneum.

This little volume of 500 pages, covering the entire range of gynecology as indicated by the list of subjects quoted above, is clearly, systematically and interestingly written. The illustrations are unusually fine and from an artistic standpoint are excelled only by some of the work done by the illustrators of Johns Hopkins University. The author evidently appreciates the Johns Hopkins corps of artists inasmuch as he has copied illustrations quite freely from Kelly's magnificent work. The work done by his own illustrators is unusually well done and does not suffer materially by comparison with the Johns Hopkins illustrators.

The description of operative technique given in the text is unusually clear and definite. The book does not abound with historical description of obsolete operations, although the author is generous in giving credit where credit is due and exhibits unusual judgment in his final selection of operative procedures. The book is pre-eminently one of technique rather than of pathology or diagnosis.

THE TEXT-BOOK OF MINOR SURGERY. By Edward Morton Foot, A.M., M.D. D. Appleton & Co.: New York and London, 1908.

This book will appeal to a great many physicians, and students as well, who, as the author states, rarely do more than minor surgery, and to whom the consultation of the many excellent text-books on surgery is too burdensome, dealing as such works do, with details of diagnosis and operations which are impossible under the circumstances confronting the average practitioner, viz., lack of modern hospital facilities, trained assistants and nurses.

The compilation of facts regarding cases treated and observed during a large and varied experience, together with a Working Index and Classification of the same renders the book a valuable addition to the library of the average practitioner.

The many photographs are valuable in fixing the pictures of pathological conditions, making the text more applicable to the case at hand.

Especially to be commended is the chapter on Bandaging which is of such importance in the treatment especially of ambulatory cases.

HERBERT A. POTTS.

A REFERENCE HANDBOOK OF OBSTETRIC NURSING. By W. Reynolds Wilson, M.D. Philadelphia: W. B. Saunders & Co.

This is a very compact and concisely developed little volume, convenient in size, well bound, up-to-date, and it contains all the information necessary for a nurse in charge of obstetric cases. The material has been ordered in a very satisfactory and perspicuous manner. A very valuable feature is the copious index. C. S. REED.

BOOKS RECEIVED.

SURGERY: ITS PRINCIPLES AND PRACTICE. Volume III. In five volumes. By 66 eminent surgeons. Edited by W. W. Keen, M.D., Philadelphia and London: W. B. Saunders Company. 1908. Per volume, cloth, $7.00, net; half-morocco $8.00, net.

DISEASE OF THE HEART. By Prof. Th. von Jurgensen of Tubingen; Prof. Dr. L. Krehl of Greifswald; and Prof. Dr. L. von Schrotter of Vienna. Edited, with additions, by George Dock, M.D., Ann Arbor, Mich. Philadelphia and London: W. B. Saunders Company. 1908. Cloth, $5.00, net; half-morocco, $6.00, net.

DISEASES OF THE BREAST. WITH SPECIAL REFERENCE TO CANCER. By William L. Rodman, M.D., LL.D., Philadelphia: B. Blakiston's Son & Co. 1908. $4.00, net.

CORRESPONDENCE

LIVER RESECTION

CHICAGO, November, 22, 1907.

To the Editor of the Nicholas Senn Festschrift,
Herrn Franklin H. Martin, M.D.

Very Esteemed Colleague:

After the publication of my article on Liver Resections in the September number of your esteemed journal, Dr. Jacob Frank, of Chicago, claims priority by referring to a paper of his published in the Journal of the American Medical Association, of August 12, 1905. He requests me to enlighten the publisher of the Senn Festschrift of my error, and to acknowledge his priority.

I am sorry to admit not being acquainted with the aforesaid article of Dr. Frank, otherwise I should have drawn the attention of my American readers to it, as the article was originally intended for them. I regret the oversight.

If in the meantime Dr. Frank claims priority for his method, I must refer to all, but one, of my successfully executed liver resections on man, by the described suture method, dating from the year 1898 to 1905, i. e., long before Dr. Frank made his experiments on animals. (A special copy enclosed, with dates of operation marked, can prove this.) The drawings in my work were taken from sketches out of my "Alten Krankengeschichten," so I cannot unconditionally concede the priority of publication to Dr. Frank.

In "Brun's Beitragen," bd. 27, s. 231-232, we find, e.g., case 5 of my series mentioned, referring to the liver suture with which I closed the extensive resection surface. That was in 1899.

Furthermore, Dr. Steida, in an article, has referred to my operation on the biliary tract, ibid., bd. 47, s. 673, illustrating in Fig. 2 my mode of liver suture.

Finally, Staff Surgeon Dr. Thöle (one of my former assistants), in a paper read before the German Surgical Congress, in April, 1905, had at his disposal, my entire material on liver resection, in which the method of treatment practiced by me, was thoroughly described. Of course, he did not enter deeply into the technical questions, therefore, the merit of testing the method in experiments on animals, belongs undisputed to Dr. Frank.

For that matter, in no part of my work, did I refer to his method of liver suture, discovered by me, for I am convinced that this or that surgeon, in conjunction with myself, now and then use the same method in liver resections. If I, therefore, have quoted my experiments and good results, I only wanted to prove thereby, that the complicated liver suture methods, so warmly recommended to us in late years, are not absolutely necessary, and that even in extensive liver resections, we can obtain the same results with the simple methods at the disposal of every surgeon.

Very respectfully yours,

PROF. DR. GARRÉ.

PRIMARY EPITHELIOMA OF THE CLITORIS. REPORT OF TWO CASES

BY EGBERT H. GRANDIN, M.D., NEW YORK
Attending Gynecologist, Columbus Hospital; Associate Surgeon, Womans' Hospital in the State of New York

This condition would appear to be of such exceeding rarity, that I report the following two cases — the only ones which I have seen during my medical career of nearly thirty years.

CASE 1. In March, 1902, Dr. Albert Kohn, of this city, requested me to see Miss N. in consultation for the purpose of determining the nature of a growth of the clitoris. He told me that he had had her under observation for a few months and that the growth in its initial stage resembled a pimple. When I saw her, a hardened mass of the size of a hazel-nut occupied the region of the clitoris. There was a certain amount of induration of the right labium minus. There were a few glands in the groin. I advised, and performed, wide excision of the clitoris and the labium. Primary union resulted. The report of the pathologist was epithelioma. After a few months, the woman died of general carcinosis.

Case 2. Seen in consultation with Dr. Henry Griswold, of this city. The woman was aged over sixty, and the clitoris was occupied by a growth the size of a small walnut. There was no glandular involvement and the labia were free. Wide excision was performed, This was in 1903. The report of the pathologist was epithelioma. In September, 1907, I saw the woman again and there was recurrence in the same region, but still no glandular involvement. I again excised the growth widely; and up to date, February, 1908, there has been no recurrence.